The Builder.

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The Metropolitan Main-Sewerage: the Northern Outfall Sewer.

IN the course of the past week, according to original arrangements, tenders were to be received by the Metropolitan Board of Works, for the Northern Outfall Sewer. An advertisement in our present number, extends the time to the 18th inst. It will be recollected that this portion of the general work of the sewerage of London, upon which the success of the whole of the operations on the north side of the Thames, excepting only what is called the Western Division, will depend, is complicated and difficult from features of the district to be traversed, and the nature of the soil. In the account of the scheme for the metropolis, which we gave some time back, we specified the principal obstacles that would have to be surmounted at the commencement of this particular sewer, within a distance of little more than a mile. The remainder of the line (making the entire length for the sewer, 5 miles 1,400 feet), passes through that very treacherous ground, the marshes, between West Ham and Barking Creek. Eighty borings have been taken along the whole line, to ascertain the nature of the soil; and the results are shown on three sheets of the drawings.

We have before expressed a high opinion of the completeness of the preparations, by the engineering staff of the Board, for subsequent works, at least in whatever is comprised under drawings and specifications; a completeness which has contributed to that efficiency of superintendence which also we have acknowledged. The details in the present case are even more deserving of notice than were the corresponding preliminaries for the contracts in hand. Of these, the chief points interesting to those who would visit the works whilst in progress, and points that might subsequently be referred to as precedents, have been all duly laid before our readers. But it may be well to state once more, for information of distant readers, that on the south side of the river, there are now in progress, works of the High-level Sewerage and of the Outfall Sewer, besides portions of the Low-level Sewer,—for which last the general drawings are not yet finished,—and that the engines and other machinery for the Deptford pumping station are in hand,—the Low-level Sewer, and the pumping machinery and reservoir at the outfall below Woolwich, being thus the only divisions of the work of which the details have to be furnished; and that on the north side of the river, the works in progress (some of which may be regarded as complete,) include those of the High-level Sewerage, the Middle-level, with a storm-water outfall passing beside the Serpentine and across Hyde Park, and what may be considered the upper portion of the Western Division. It should also be recollected that the Hackney Branch, which is included with the contract for the High-level, will intersect the line at Old Ford, and pass southward to join eventually the Low-level Sewer. After that portion of the scheme which we are about to describe, there will remain for particular design, the works, on the north side, of the Low-level Sewer, of the pumping machinery, of the reservoir at the outfall, and those generally of the Western Division.

The difficulty which there is for us, in presenting in moderate space, the interesting and useful points to be noted in examination of the drawings and specification now before us, will be supposed from a mere statement of their bulk. The form of contract, which embodies the specification as well as a schedule of prices for possible extras or omissions, fills eighty-five printed pages, besides six pages of an index; and the drawings occupy seventy-five large sheets. The specification contains 267 clauses. The details we have to notice will be understood best if we here give, as succinctly as we can, the particulars of the course the sewer will take.

It will be well remembered that the works comprised in the contract for the Northern High-level Sewer terminate at the western bank of the Lea. These include a portion of the outfall as well for the Middle-level as for the High-level division. The Northern High-level and the Middle-level Sewers, after a junction at the overflow-chamber, so often described, westward of the North London Railway, proceed in separate and parallel channels to the point from which the works now to be noticed commence, the before-mentioned western bank of the Lea, where, also, and slightly divergent on plan from the upper channels, there are two outfalls at a lower level, for storm-waters. The parallel channels of the upper level or main outfall, (two sewers, in fact,) are to continue, crossing several different watercourses and branches of the Lea, and intersecting the Eastern Counties Railway and the Stratford-road, to the site of the intended pumping station and junction of the Low-level Sewer, which is just westward of the branch known as the Abbey Creek of the Channelsea River, itself a portion of the waters of the Lea. Thence to the Thames, just westward of the mouth of Barking Creek, the Northern Outfall Sewer, so called, will continue as three channels,—except at the outfall itself, and excepting in one or two other places where it has been necessary to divide the flow into a greater number of courses. The general line is easterly or south-easterly, except at the outfall for rather more than 800 feet from low-water mark, in which distance the line has turned to the south. The sewer will have a uniform inclination of 1 in 2640, or 2 feet per mile, to the end of the general construction, where the invert appears to be about 1 foot below high-water level, after which there are a tumbling bay, nine lines of sewer, and lastly campsheating, together falling about 18 feet in a length of 400 feet to near low-water mark. The ground over the sewer or sewers will form a continuous embankment and a new line of road. The line intersects, in the following order, the main branch of the Lea, the East London Water-works Feeder; at an acute angle, the Pudding-mill River and Marsh Gate-lane; similarly the Eastern Counties Railway and the City Mill River close southward of the crossing of the latter by the former; afterwards the Water-works River and the Stratford-road; Abbey Mill-lane; Abbey Creek, and the Channelsea River close together; the North Woolwich Railway at the intersection of Marsh-lane, the Bow and Barking Railway, Balaam-street in the town of Plaistow, Barking-road, and many lanes and water-courses requiring special provisions. The line crosses East Ham Manor-road just south of the church.

Each of the channels, two, or three, of the sewer, will be 9 feet in the span of arch, or the clear width between the curved sides, and 9 feet from the invert to the soffit; and excepting for about one-fourth of the length, or the portion eastward of the church just named, where cross walls or piers of concrete are used and arches, and excepting where the channels or culverts will be on foundations slightly below the present level of ground, and of course excepting the crossings, the brickwork will be placed on a continuous substructure of concrete, which, in some places, will be not less than 14 or 15 feet in depth from the bottom of the sewer, and 50 to 60 feet transversely at the base, in addition to what is carried up as continuous counterfort to the sides of the sewer. There may have been good reason which is not apparent, for the adoption of the imbedded piers of concrete with arches, for support in one case, and the solid embankment of concrete in the other.

It will be understood that in all the crossings, as of railways, roads, and streams, over or under them, the 9 feet in clear height of culvert, *plus* a roadway above, had to be provided for; and that thus the difficulty of crossing was increased. The requirements of the "Metropolis Local Management Act, 21st and 22nd Vict.," are stringent as to the non-obstruction of the navigation of the streams. In most of the cases the construction is of iron, and the drawings are very elaborate. Of course provision had to be made for contraction of the iron, without allowing sewage to escape. The mains of the Water-works Company also entailed special contrivances. The land on the line from the Lea, of the width of 100 to 150 feet, has been, or will be all purchased by the Board.

In construction of the main portion of the line, a good foundation is to be first obtained by excavating; and the concrete is then to be deposited with sides at a slope of 1 to 1, finishing along the sides of the sewer within 2 feet 6 inches of the soffit of the arches. The inverts and side walls of the sewers, the former 13½ inches thick, and the latter 2 feet 3 inches for the external walls, and 18 inches for the internal parallel divisions, will be built in Portland cement; whilst the arches and continuation of the side walls above the springing, will be in Roman cement. The former cement is to be of not less weight than 106 lbs. to the bushel of four pecks, and the Roman not less than 73 lbs., the Portland to be mixed two of cement to three of sand, and the other in equal parts. The concrete, so far as the embankment aboveground is concerned, is to be composed of four measures of approved ballast, one measure of sharp grit sand, and one of the best description of Dorking, or other stone lime of equal quality to be approved, the whole to be mixed in a pug-mill, and thrown in from the greatest practicable height. But, for the foundations of piers of bridges, and brickwork over streams, as also where to be used below present surface of the ground, the same proportion of ballast is to be mixed with two measures of sand, and one of freshly burnt lias lime. All the lime is to be delivered in lump, and ground upon the line of works. The ordinary bricks are to be the best description of picked stocks; but the inside of each sewer is to be faced with "shippers or paviors," to be according to samples at the office of the Board. Joints of the brickwork are not to exceed 3-16ths of an inch in thickness next the interior surface; and the external joints are to be raked out and pointed with neat cement. Hoop iron of 1 inch in width, and 1½ lb. to every 10 feet length, is to be used in the outside walls of the sewers, four widths in every fifth course, also at the bridges; and at the outlet near the river, there are to be two widths for every brick in thickness. The facing of the soffit of arch and top of invert, is to consist of half-brick rings on edge, and particular directions are given for the work of the side walls, in old English bond, for the wetting of the bricks, and for the immediate carting away of old or rejected bricks; and no broken bricks are to be brought on the works. In all cases where excavations are made for brickwork, embankment or otherwise, the trench is to be filled with concrete, and wherever the drawings indicate "made ground," concrete is to be used. Where the concrete piers are used, we observe that they are to be only of the width, 37 feet 6 inches, required for the width of the three lines of sewer. The space apart, or span of the arches springing from them, and carrying the sewers, is about 18 feet; and the thickness of the arches is 18 inches. Each ordinary pier, of concrete, will be the 37 feet 6 inches by 4 feet on the plan; and is to be estimated as about 16 feet in depth from the present surface (which has about the same level as the line of springing of the arch), down to the surface of gravel or foundation of good ground. Every sixth pier, however, is 6 feet across, instead of 4 feet. The backing of the

arches is made up with concrete, wherein 3-inch pipe drains are laid to the ditches outside the line of sewer. The continuous counterfort of concrete to the sides of the sewer, as will have been understood, is not provided in the portion of the work just described. The external faces, however, of this portion, as well as of the concrete slopes of other portions of the line, are to be covered by outer slopes of 1½ to 1, with dry rubbish or other material, well rammed in layers of not more than 6 inches in thickness, with an iron punner of not less than 10 lbs. weight,—the top of the embankment, or roadway, finishing 40 feet in width, and 2 feet 6 inches above the crown of the arches of the brickwork. Each ditch at the toe of the embankment, will be 3 feet 6 inches wide at the top, and 1 foot 6 inches at the bottom, and about 2 feet 6 inches deep, and will discharge into the present open ditches. Before the roadway is formed, 12 inches in depth of clay-puddle will be placed along and over the top of the brickwork, and down to 1 foot below the top of the concrete slopes. The external slopes are to be faced with turf of not less than 4 inches in thickness; or where the land is arable, particular directions are given for sowing with grass seeds; and the kind of quicksets for the hedges, and manner of planting also are specified. Culverts of brickwork in Portland cement are to be built in the open ditches met with and intersected. These works, in 1½ brickwork, alone amount to 520 feet of 7 feet by 6 feet; 620 feet of 6 feet 6 inches by 5 feet; 820 feet of 4 feet by 3 feet, and 500 feet of 2 feet barrel. Numerous side entrances and air-shafts will be required. The latter will be of the common form, and the others not greatly different from it. Where the side entrances occur, openings will be formed in the division-walls of the sewers, to allow of access from one to the other; and in each opening, double flaps will be placed.

Besides the work in raising Balaam-street, Barking-road, Prince Regent-lane, Blind-lane, and East Ham Hall Manor Way, and the lowering of Marsh-lane and West Ham Abbey-lane, there will be forty "occupation roads" to be formed, to lead to the lands on each side.

The more important works in the construction of aqueducts or bridges, include the bridge over the Lea, of one span; the bridge over the Waterworks Feeder, of two spans; that over Marsh Gate-lane, Pudding Mill River, and (Knobb's Mill) Marsh Gate-lane, of four spans; that over the City Mill River, of one span,—each of these carrying the double line of sewer; the bridge over the Waterworks River, of one span, carrying four lines of sewer; that over Abbey Mill-lane, of one span, carrying a double line; and that over Abbey Creek and Channelsea River, of two spans; that over the Bow and Barking Junction (intended) Railway, Marsh-lane, and the North Woolwich Railway, of three spans; and that over the Bow and Barking Railway main line, of one span (besides certain bridges of one span, over occupation roads), all carrying the triple line of sewer. In some of these cases, the construction is repeated: but separate designs and sets of drawings have been required for the bridges of the Lea, the East London Waterworks Feeder, and the Waterworks River near Stratford-road; for the works adjoining the latter and crossing the road; and for the bridge over the Bow and Barking main line, as well as for the crossing over the Waterworks main, and the method of passing under the Eastern Counties Railway, and of crossing Balaam-street and other roads. The outlet into the Thames, the tumbling-bay, nine culverts, and other works, also are the subject of distinct drawings and clauses of the specification. In our present limits, we cannot do more than say that each of these features in the design of the Northern Outfall Sewer displays much ingenuity in contrivance, and great variety of construction; and much experience of corresponding varied character, as well as large resources, will be necessary in whomsoever may be the contractor.

The contractor is to provide for works which may be required or deducted, 200 rods of brickwork in Portland cement, 10,000 yards of blue lias lime concrete, 10,000 of the concrete of Dorking lime, 500 feet of Bramley Fall stone, the largest block not to exceed 30 cubic feet, the outer faces, beds, and joints to be dressed; 500 feet similarly of Aberdeen granite, the largest not to exceed 30 feet; and 1,000 yards of 3-inch tooled and squared York stone, bedded, jointed, and laid. In the schedule of prices, such brickwork as that mentioned, in blocks or otherwise, is set down at 15*l.* per rod, that with "shippers or paviors" being 17*l.* The concrete with blue lias lime is priced at 7s. per cubic yard, and that with Dorking lime at 5s. 3d., but where ballast is got out of the trenches, at 3s. 6d. Under the head of stonework, Bramley Fall stone, tooled, squared, and bedded, is priced at 4s. 9d. per foot cubic, and the 3-inch York stone, at 9d. per foot superficial,—2½-inch being 7d., 4-inch 1s. 6d., and 5-inch 2s. Digging, including every expense of shoring, watching, carting, and so forth, and filling in and punning, are priced 2s. 6d. per yard, and without cartage, 2s. But in the case of foundations of piers of bridges, the same kind of work, including carting, is put at 7s. 6d. per yard, to defray every expense of keeping the work clear of water, a matter which may possibly involve, as in the recent case of work connected with the Low-level sewer on the south side, extraordinary difficulty and attendant expense. Timber, Memel or Riga, left in trenches, is to be charged per foot cubic, 2s. 6d.; and used as sheating, piles, and similar works, 5s., with the necessary caps and shoes: 12 feet planks left in, are to be 3s. 9d., and 1¼-inch deal is to be 3½d. per foot super. Cast-iron work in side-entrance flaps, will be 18s. per cwt.; in gully and ventilating grates, 12s.; and in covering plates, girders, pipes, and columns of any pattern, 10s. Wrought-iron work as in ladder-irons, will be 3d. the lb. Clean Thames ballast will be 4s. 6d. per yard. Labourers will be 3s. 9d. the day of ten hours; excavators, 4s. and 4s. 6d.; whilst bricklayers and other workmen, except engineers, who are 7s., will be 6s.

In the general conditions upon which the works described are to be performed, besides such usual clauses as that the decision of the engineer as to meaning of the specification, is binding, it may be noticed that in case of any suit against the Board, or any of their servants, in respect of damage from the execution of the works, the Board may compromise the action, and at the same time claim indemnification from the contractor. The contractor is not to assign the contract, nor to make a sub-contract with any workman for any part of the brickwork, earthwork, masonry, or work connected with these; and under pain of a forfeiture, he is not to give a gratuity to any officer of the Board. Weekly accounts of extras and omissions ordered, are to be delivered. When improper materials directed to be removed, are not sent away in twenty-four hours after orders, they may be removed at the expense of the contractor, who may also be made to forfeit as damages, 5*l.* for every day's delay. Obstruction to footways entails similar damages on the contractor. Coins and other articles of value, are to be delivered up. The works are to be finished within two years after date of the order to commence; or 50*l.* per day will be claimable as liquidated damages; but in the event of strikes or combinations on the part of the workmen, the engineer will allow such additional time as he may deem fair and reasonable. Moneys payable to the Board by the contractor may be sued for and recovered on the contract, or may be retained out of moneys due or to become due, even though the sum to be retained may be unascertained at the time of the withholding. The sum of forty thousand pounds for extra works, is to be included in the tender. Advances are to be at the rate of 90 per cent., as the works proceed, until one-half the contract is completed, when a further 5 per cent. will be advanced upon the amount of work executed. Similarly, 90 per cent., and 5 per cent. will be advanced, as regards the second half of the works, and also the remaining 5 per cent. upon the approximate value of the first half. But such advances are not to be made oftener than monthly: nor are they to affect any subsequent question, or to be taken as admission of any particular work. A further advance of 2½ per cent. will be made in three months from completion of the works; one of 1½ per cent. at six months; and the balance will be paid at the end of twelve months, provided the contractor shall have given a full account of all his claims, and the engineer shall give a certificate. Two sureties, jointly and severally in 20,000*l.*, are to be found by the contractor; and no member of the Board is to be personally liable; the payments being to be made out of the funds in the control of the Board. Mr. Edmund Cooper will be the resident engineer, under Mr. Bazalgette.

The least difficult portion of the work, so far as foundation is concerned, would seem to be at Plaistow, where the hard gravel is reached within two or three feet, and where the invert of the sewer for about 2,500 feet of length, will be below the present surface level. In other cases, as near the Lea, where the greatest height of embankment will be required, there is made-ground to a considerable depth.

ON ROUND CHURCHES.*

The Knights of St. John were so named, in the first instance, from their patron saint, John the Patriarch, and they were called also Hospitallers, from their early connection with the hospital, or hostel, or hotel (for it is the same word), attached to the St. Sepulchre at Jerusalem, for the reception of pilgrims to the sacred places. Originally they were Brethren of Mercy attending on the sick, the poor, and the stranger, and rendering them the offices of hospitality and charity. But about the year 1113, when the disturbed state of the Holy Land drove them from these works of peace and love, the lay members of the society drafted themselves off into a new order, under the name and guardianship of St. John the Baptist, taking the three vows of poverty, chastity, and obedience, and making the defence of the holy places and their visitors the main object of their union. These Knights Hospitallers of St. John, being first called of Jerusalem, were afterwards known from their possessions and change of domicile, successively as Knights of Cyprus, of Rhodes, and of Malta, at which last place many vast buildings and unedited records yet remain. Their dress was a black cloak, with white cross, in contradistinction to that of the Templars, which was white, with a red cross. They became exceedingly powerful and numerous in England, and at one time, after they had acquired the possessions of the dissolved Templars, they had as many as 53 establishments or "commanderies" ("preceptory" was the name assigned to the Templars' houses) in this kingdom, of which I may mention one—Dingley, in this county, in the cellars of whose modern houses there are yet, I believe, remains of ancient vaulting, as early as the time of the Knights' proprietorship of the place. Long after their occupation was gone they lingered on, a rich and dreaded body, who might longer have stood their ground, and kept their own, had not the sweeping revolution of Henry the Eighth whirled them along in the wholesale destruction of all kindred societies. However, they had spirit enough to "die game," and our native historian, Fuller, speaking of their dissolution, says:—"The suppression of the Hospitallers deserveth especial notice, because the manner thereof was different from the dissolution of other religious houses, for manfully they stood it out to the last, in despite of several assaults. The Knights Hospitallers (whose chief mansion was at Clerkenwell, nigh London), being gentlemen and soldiers of ancient families and high spirits, would not be brought to present to Henry VIII. such puling petitions, and public recognitions of their errors, as other orders had done. Wherefore, like stout fellows, they opposed any that thought to enrich themselves with their ample revenues, and stood on their own defence and justification. But Barnabas-day itself hath a night, and this long-lived order, which in England went over the grave of all others, came at last to its own."

And this last grave of its last prior is yet to be found in this county. In the parish church of Rushton (removed, I believe, from the destroyed church, which stood in the last century close to the hall), is the beautiful monument of Sir Thos. Tresham, in his robes of prior of the order of St. John of Jerusalem. Though Henry VIII. suppressed the order, Queen Mary revived it on her

* See p. 623, *ante*.

attainment to the throne, and appointed Sir Thos. Tresham, well regarded for his adherence to the unreformed faith, as the head and prior of the order in England. He died shortly after, and this most unique and curious, but little known, monument (of which I am enabled, by a friend's kindness, to exhibit a most faithful drawing), remains a singular memorial of the last brief revival of this ancient society; though I have an indistinct recollection of seeing, on the walls of the Royal Academy, either this or last year, a full-length portrait of Sir G. Bowyer, M.P., in the robes of the prior of the Knights of Malta.

Still grander monument of the order, and in closer connection with our present subject, is the round church of Little Maplestead, in Essex, the most perfect of all the crusadic churches in England, and which, by the cruel irony of Time, though still a parish church, has passed from the patronage of the world-known and dashing Hospitallers into that of an obscure and feeble sect of Sabbatarians.

Founded within a few years of the same time (1118) was the order of the Knights Templars, who were of a more exclusively military character, and effected no deeds but deeds of arms. Nevertheless, the rule of discipline was strict, and after St. Bernard's rule. They took their name from a palace adjoining the Temple at Jerusalem, which was appropriated to their use by Baldwin I. Their dress was a tunic of chain-mail, with a long white cloak, on which a red cross was subsequently engrafted, and became their well-known badge.

They came to England in Stephen's reign, and first settled in Holborn, whence they removed to the site nearer the Thames, which, though the arms have yielded to the gown, and the long white cloak of the soldier to the long black robe of the lawyer, still retains the name of the "Temple;" and rejoices in that round Temple Church, which exhibited almost the first noble, though still imperfect, example of the spirit of church restoration which has since so widely spread. The pride and haughtiness of this order brought it to an early fall, and though the name of the Templar is more popularly known than that of the Hospitaller, the existence of the former society was of far shorter duration, the Templars having been, with great severity and cruelty, suppressed in the fourteenth century, and their lands passed over to their more fortunate rivals. Of their domains, of which the Hospitallers took possession, I may name as places probably familiar to most of you, Temple Bruern, in Lincolnshire (described in the volume of our architectural reports for 1858), Temple Balshall, in Warwickshire, and Rothley Temple, in Leicestershire. I do not find that they were ever established in Northamptonshire, and I am told to-day that they had possessions at Hardwick.

The ground-plan of the Temple Church is the least elegant of all that remains, the round being smaller in proportion to the rest of the building, and forming rather a vestibule than the chief feature of the church. It differs from our own church in having twelve instead of eight piers, and so far has closer resemblance to the plan of the original. In its triple arches, opening from the rotunda into the chancel, it follows its Northampton sister.

We have, then, the round church of the Temple built by the Knights Templars, the round church of Maplestead by the other great society of the Hospitallers, while in the other two round churches, of Cambridge and of Northampton, can be traced no connection with either order; but they sprang, in all likelihood, from the unaided bounty of individual benefactors; that of Cambridge from some unknown pilgrim or crusader, whose name has perished, though his good work remains; that of our own town, from indirect but very convincing evidence, may almost surely be attributed to the first great name in Northampton annals,—Simon de St. Liz, first Norman earl of this county, the founder of the castle, and of St. Andrews, twice a pilgrim to the Holy Land, and whose name has become so identified with Northampton as to have gained a settlement in the racing card of the spring meeting.

Twice, at least, after the erection of this church, was the town of Northampton prominently connected with the Crusades. On the 14th of September, in the year 1189, within a fortnight of his ascent to the throne, Richard Cœur de Lion assembled a council, at the neighbouring Abbey of Pipwell, of all the English and Irish Bishops, the Abbots and Priors, and lay nobility, to organize a crusade for the recovery of the Holy Sepulchre—and, no doubt, the now remote site of Pipwell was selected, both for its central position as regards the whole kingdom, and its contiguity to the neighbouring commandery of Dingley. After his return to England in 1193, Richard kept his Easter with great pomp in this town, and, we may hope, knelt in thankfulness in the round church of this town, so suggestive of the object for which his wars and his perils had been undergone.

Again in 1240, the twenty-fourth year of Henry the Third's reign, a gathering of nobles took place in Northampton, previously to their setting out for Jerusalem; and again on Midsummer-day, 1267, in the fifty-second year of his father's reign, Prince Edward, with upwards of a hundred knights, here assumed the cross, previous to their departure for the Holy Land, in the presence of the King and the Queen Eleanor, who was afterwards to be so gracefully bound up with the associations of Northampton in the beautiful cross which is the finest architectural monument it can boast.

There are other slighter connecting links between Northampton and the Crusades, which I pass over, not professing to have made any research into the subject beyond what may be found in the commonest histories of the place. You may expect me, however, before I conclude, to refer to the past and existing state of your own church, though that subject has been more fully and faithfully treated by Mr. Poole this morning. I need hardly tell you how sadly the original form has been marred, even in times to which we have generally given the credit of knowing better. Originally consisting only of a round and an apsidal chancel, the present round pillars were some 2 feet lower than they now are. They supported an open gallery or triforium, and above that was a circular clerestory (not octagon, as we now see it), crowned by a conical roof. The circular aisle (if I may so call it) running round the pillars was groined over. There were round-headed windows, alternating in position in the aisle and triforium, some of which yet remain. Probably, in the fourteenth century, the roof and vaulting had decayed, and the restorers in those and subsequent days thought it cheaper to pull down the whole of the vaulting, turn the two lower stories into one, raise the piers, put up pointed arches, insert large windows, add chancel aisles and two more arches into these new aisles, turn the round clerestory into an octagon, and otherwise mar the original design. Subsequently the tower and spire were added at the west end; and then, in still more recent times, followed the abandonment of the chancel and its aisles, the accumulations of galleries and pews, stoves and pulpit, into the round: so that it has been said, and I know it to be a literal fact, that strangers have gone into St. Sepulchre's to see the round church of Northampton, and have come out again conceiving that they had mistaken the building, so utterly is its characteristic form obliterated. Now, whether we shall ever restore it to its original form, whether even it is desirable to attempt to do so, to make it again "as round as the O of Giotto," I will not undertake to say. When we have placed the congregation in the new nave beyond it, and the choir in the new apsidal chancel, still further eastward, it will be time to see what can be done with the round. It will, at any rate, be a vestibule to the church, at the same time that it forms a most noble baptistery, with the font in the centre. The plans before you will show that, in round churches, the round was not always the nave, as it was originally here and in all the English churches. Sometimes it formed merely the vestibule, sometimes the nave; sometimes was placed between nave and chancel, sometimes formed the chancel itself, or the apse, eastward of the chancel. Sometimes it was an attached chapel, sometimes a detached baptistery or tower. But in all these churches, which were distinctly imitative of the rotunda of the Holy Sepulchre at Jerusalem, it formed the western or nave portion.

Symbolically, the Round church has its significance; imitatively, its associations; and, æsthetically, its beauty; but its circular form is not fitted—never was fitted—for devotional and congregational purposes.

There is one case only in which it is well suited for Liturgical use, viz., for the administration of the sacrament of baptism. To this the round form was early devoted: to this it should have been confined. For a ceremony admitting many spectators, directed to one central object, no form could be more beautiful or more convenient. But it is not suited for the Holy Communion, nor for prayer, nor for preaching. Your own experience in St. Sepulchre's, and its present anomalous arrangement, prove this: it was a bold thing, therefore, for a lecturer in this town, not long ago, with such an example close at hand, to advocate the round form for English churches. There are fashionable watering-places where the experiment has been tried, and octagon chapels were once becoming popular in London, but even as mere preaching-houses their form is inconvenient, and still less is it adapted to the Liturgical services of the Church of England.

It is well, therefore, that you propose to give up the Round for congregational purposes, and place the worshippers in the rectangular portion eastward, reserving the round as a most noble vestibule, and most appropriate and serviceable baptistery, in the centre of which a font, worthy of the position, may, I hope, soon be placed as a memorial to the late Marquis of Northampton, who took so much interest in the church, built by the first Norman earl of the same title. When the contemplated extension of the church is completed, and the present cumbrous fittings of the round swept away, I can conceive no interior more picturesque and unique than what St. Sepulchre's will furnish to a spectator standing under the western tower, which will then constitute an outer porch. I feel sure that there will not be one contributor to its enlargement and restoration who will not feel that, whatever he may have given, it will have been more than repaid him even by the architectural effect produced.

Before I conclude, I would briefly sum up the inferences which may be drawn from the very cursory and imperfect statements I have made on the very wide and as yet unexhausted subject of Round Churches. You will at least have seen that our four round churches are only a small remnant of a much larger number which once existed in England, and that these were not invariably connected with the orders of the Templars or of the Hospitallers, though probably in almost every case (the round chapel of Ludlow Castle perhaps being one exception) with some crusader, or pilgrim to the Holy Land, and therefore constructed in imitation, more or less direct, of the Rotunda of the Holy Sepulchre at Jerusalem; in all which cases, as I have said, the "round" constituted the nave or western portion.

But from the earliest Christian ages, and linking on by subtile but unbroken chain, with ancient Rome and Greece, and indeed with the monumental history of almost every people, there existed a series of tombs, towers, temples, baptisteries, chapels, of circular or curvilinear form, which had no connection with the Holy Sepulchre (except that it was itself one link in the general chain), and which, quite irrespective of any imitation of that sacred building, are to be traced in the round portion, wherever situated, of the ecclesiastical buildings of the Middle Ages, and which received their greatest and final development in the manifoiled and multangular apses, which constitute so striking and beautiful a feature of the finest continental churches.

In contradistinction to the use of the rest of Europe, England kept steadily, as a rule, to a square east end, and though at Canterbury and Tewkesbury, and in a few other noted examples, the circular form appears, yet often, with obstinate and hardly excusable persistence, as at Peterborough and Westminster, she capped the curved apse with a rectilinear addition, protesting, as it were, against the foreign element, and reserving the round form for the western end. Round apses have been a favourite resuscitation with modern architects, and where, as in the new chancel of St. Sepulchre's, they can give the reason why, there can be no objection to their introduction, but a new round church we can never hope, never wish, to see again: the reason and the feeling for it are past; and its form, which was ill-suited even for the unreformed church, is doubly so for our own. As a baptismal vestibule, nothing can be grander; but in these days we want too much room for our congregations to be able, in a new church, to throw away so much space on mere architectural effect. The more incumbent upon us, therefore, is it to preserve that unique and beautiful feature, when we find it here. The fifth round church in England we shall never see; but we may yet make ours the most remarkable of the remaining four. There is more of the original in Maplestead, more completeness in Cambridge, more splendour of decoration in the Temple; but for size and usefulness, for correct arrangement and artistic effect, for local association, and, above all, for supplying the urgent spiritual wants of a daily increasing parish, the work which your committee has taken in hand will, if carried out in its integrity, yield to no church restoration, whether of round church or square; and will, when finished, become the glory, as it has hitherto been the shame, of Northampton. That work is now thrown upon your

hands, and I fully believe that you will accept the responsibility, and carry it out. Don't trust to great men, or to rich men, or to strangers; but do you, the middle classes of Northampton, hold it to be an honour that you have such a church to restore and enlarge, and enlarge and restore it accordingly.

SOCIAL SCIENCE IN GLASGOW.*

Each morning's business of the Social Science Association was opened with an address in the City Hall to the whole body, from the President of one of the Departments, and then the members dispersed themselves to the various sectional meetings to hear and discuss papers. These sectional meetings were held in the College Schools, which have but one entrance, and that close to the platform, so that they were very inconvenient. On Thursday, the address in the City Hall was read by the Hon. A. F. Kinnaird, M.P., on Punishment and Reformation: on Friday, Sir James Emerson Tennent spoke eloquently on Social Economy; and on Saturday, Mr. Edwin Chadwick discoursed on "Public Health." These presidential addresses have been fully reported in the journals. We must confine ourselves at present to the papers and discussions in one or two of the departments which more specially belong to us, but shall refer hereafter to Mr. Chadwick's address. Of some of the papers and remarks on "Trades' Unions and Strikes" we shall also make mention under a separate head.

Returning, then, to the proceedings on Tuesday, a paper was read by Mr. John Watts, Ph. D., on

Co-operative Societies,

which the writer thus concluded:—

Although the possibility of great success and of great usefulness is now demonstrated, the further spread of these societies is not likely to be barren of failures any more than will future individual enterprises; but a few failures do not stop general trade, nor will they stop the progress of co-operation; nor is it likely that, with ordinary prudence, the Court of Chancery will be often troubled to wind them up. They are, of course, open to the common danger of a business entrusted to management,—the danger of dishonesty; but, where all the assistants are shareholders, and working under superintendence, and obliged to deposit security either by private bond or by the policy of a guarantee society, a greater danger than dishonesty is deficient judgment in the selection and purchase of goods. A well-conducted co-operative store is a large business with a guaranteed round of customers and cash payments, and therefore with very little risk of bad stock, and none of bad debts. But if inferior goods are supplied, or more than the average marked price is charged, the general public first ceases to buy, and then the members, one after another, draw out or sacrifice their shares in preference to paying more than market price, even with the prospect of getting a portion of it back again as profits. So, in a co-operative manufactory, if well conducted, it is not only a safe place of work, but it is a land and building society and savings' bank combined. Every workman, being interested beyond mere wages in the success of the concern, will endeavour not only that a full day's work shall be done, but also that it shall be well done; and the result will be that the yarn, or twist, or cloth of that mill will command the market; but if the manager be not a good buyer, and so gets inferior material to work up; or if the workpeople have not confidence in the manager and his assistants; then the goods will deteriorate in quality and the market will be lost. A few years ago a co-operative manufacturing concern was started at Padiham, in Lancashire, and at first made good progress; but in course of time too many of the workmen wanted to be overlookers, and they came to quarrelling. They had invested about 7,000*l.* and were owing about 9,000*l.*, a sum which continued success would very soon have covered; but during the quarrel one of the shareholders broke into the mill at night, and cut out a large proportion of the warps from the looms. The creditors, looking forward to a certain loss by such proceedings, came at once upon the estate and realized, and the shareholders lost the whole of their money. Another manufactory was started in Pendleton (Manchester), and from similar causes had the same kind of result. But the rocks which wrecked these attempts are now marked on the map of co-operative progress; and, it is hoped, sufficiently marked to be avoided in future. And instead of wondering at the progress of these efforts by working men, to secure a larger share of the fruits of their own toil, we shall begin soon to wonder why strong existing organizations do not adopt the principle; why, for instance, the 20,000 members of the Amalgamated Engineers' Society do not apply their 100,000*l.* stock to the establishment of a co-operative steam-engine manufactory, a boiler manufactory, or a mule and loom manufactory; why the masons do not use their trade funds in working contracts on their own account; why the bricklayers, joiners, and painters do not build and finish houses, either by contract or for sale; and why, in any case of dispute with employers, such as led to the great strike at Preston, or in the late case of the building trades in London, or the strikes at Coventry and Colne, the workmen, instead of striking work and starving, or sending out begging messages throughout the country, do not continue to work, and, by increasing their subscriptions to the trade society, in due time try the power of the pence in establishments of their own. Such a course would increase, instead of decreasing, the wealth and comforts of society; would raise instead of demoralising the men; and would bring a new element into the competition of employers, showing them that, whilst the utmost cheapness of production consistent with the welfare of society is desirable, it is necessary at all times to consider the connection between the amount of wages paid and the possibility of an intelligent man bringing up a family thereon.

* See page 617, *ante*.

Manufacturing Companies, either wholly at Work or in Progress of Erection, &c.	
Bacup and Wardle Commercial Co. (1850)	£40,000
Do. Additional (1859)	20,000
Rossendale Industrial (1854)	40,000
Rochdale Co-operative Infy. Co. (1855)	50,000
Walsden Do. Co.	8,000
New Church Spinning and Manufacturing	40,000
Bury and Elton	40,000
Bury Co-operative	40,000
Bury and Heape	30,000
Crumble Manufacturing	20,000
Heywood Commercial	5,000
Heywood Spinning and Weaving	20,000
Middleton and Tonge Cotton Mill	20,000
Calliards Rochdale Manufacturing	50,000
Manchester Cotton Mill	20,000
Bagslate Manufacturing	10,000
Lancashire and Yorkshire Cotton Mill	100,000
Rawtenstall Cotton Mill	50,000
Rossendale Co-operative	50,000
Bacup Cotton Mill	20,000
Haslingden Cotton Mill	50,000
Church do. do.	50,000
East Lancashire	100,000
Bury Engineering	20,000
Bury Paper Mill	50,000
Bury Waggon Co.	20,000
Atherton Cotton Spinning Co.	25,000
Oldham Spinning Co.	30,000
Manchester and Salford Spinning Co.	20,000
Middleton Spinning Co.	20,000
Laneside Industrial Co.	30,000
	£1,088,000

Sanitary Legislation.

On Wednesday, in the department of Public Health, Mr. Monteith, of Carstairs, presiding,—

Dr. Lankester made a spirited and telling address on the results of recent sanitary legislation in the metropolis, and described the working of the Metropolitan Management Act. One of the great functions of civil government, he said, was to protect the life in the community out of which it sprang. This was necessary to its religious and moral existence. It was only as the health of the body was protected that it became a fit and proper receptacle of the mind; and that was a general position which should be held prominently in view. The sanitary affairs of the people were generally entrusted to small boards or vestries; and these could not be easily convinced that disease and death among the people was an expensive thing. They did not think in the same way of their cattle, just because animal life was a marketable commodity. Amongst the blacks in America, the money worth of a human being was better realised. Now the money value of lives in this country was of much greater value, though this was overlooked. Supposing the life of a human being were worth 100*l.*, and that the rate of mortality of any locality were found to be very high, such as had been shown to be the case in Greenock; they could easily see the vast amount of money that was squandered away by the neglect of sanitary laws, and which might be turned to a much better account. They should try to realise the value of a human being in a money point of view, and they would see that disease and death were very expensive things. Speaking of the duties of the medical officer of health and the sanitary inspector in London, he said he himself had been called, a short time ago, to the Marlborough Police Office, and had found the cells there in a very dangerous condition from the want of proper ventilation. Churches and theatres had been found to be very badly ventilated; and the influence of the public officer had been found to be of great value in remedying these buildings. Workshops, too, were often found to be in a very bad state from the same cause, and employers were not so ill to deal with as the prejudices of the workpeople themselves. Among them there appears to exist an impression that a workshop could not be properly ventilated without being dangerously cold. The people could not be impressed with the value of fresh air in their apartments. Every room must be imperfectly ventilated the windows of which did not come down at the top; and yet people could only with the greatest difficulty be induced to go to the expense of having their windows so constructed. In towns where the death-rate was fifty in the thousand, that was murder; and he hoped the day would come when corporations who showed such a rate would be arraigned for it criminally. The kitchens of old houses there, which were underground, were generally occupied by families, and were found to be a very great source of disease. He found from a paper, which had been read in reference to Glasgow, that in some places people lived where there was only a space of a yard and a half to each person. People would not keep the inferior animals in such a space. A cowkeeper would never dream of adopting such a course with his cows. He referred to the original bad construction of Burlington Arcade, where the death-rate had been thirty in the thousand; but the roof had been raised, and a better state of ventilation introduced. One of the worst-drained houses in the metropolis had been that of the Bishop of London; and, during the absence of the bishop, he had visited the house, and introduced some alterations, which would have a beneficial effect, he hoped, on the health of the bishop for the future. He would like to see an organization, having for its object the improving the public health. They had lately seen what had been done in the great volunteer movement: let them organise, in the same way, a system by which they would have healthy mothers and healthy children to form these volunteer corps. The speaker concluded by recommending, to the notice of all, the efforts of the Ladies' Sanitary Association.

Architects and Sanitary Arrangements.

Mr. Chadwick impressed upon the meeting the necessity of getting returns of the disease and death rates of the community, by which they could at once see upon what portion of a town there was the greatest necessity for operating sanitarily. He had sent down to Glasgow to ascertain the death rate, but found there were no available data. There was no measure of economy so profitable as enforcing such a return. It was easy to be got, and would be sure to be followed with good results. Architecturally, sanitary science was a department which ought to be cultivated. Medical men should be enabled in these times to send their prescription, not only to the apothecary, as they had been in the habit of doing, but to the architect. He thought that architects were scarcely doing their duty in this respect, or houses would not be built as they were, with all the old defects and inconveniences. If architects were paying attention to these matters, he hoped Mr. Godwin would tell him so. As to hospitals also great improvements were needed.

Mr. Godwin said he could not allow Mr. Chadwick's inquiry to pass without stating on the part of architects that they had, unfortunately, nothing whatever to do with the great mass of habitations erected in the United Kingdom; and that, even where they were employed to design private houses, the question of expense, and dislike to novelties felt by employers, prevented the introduction of new inventions and arrangements. With respect to hospitals, what had been done for many years past in this country was most unsatisfactory; but he believed attention had been awakened to the advantages of what was known as "the pavilion principle," which he and others had been advocating for some time. It was distressing to see what had been done by the Government. As to the great hospital at Netley, where thousands were being spent, he had pointed out, in the *Builder*, when the first stone was laid, the error of the plan, and asserted that, if so carried out, it would destroy more than it cured. This view had been confirmed by Miss Nightingale and others to the fullest extent.

A paper by Mr. G. W. Muir, on "Sewers and Sanitary Reform," was read, in the course of which it was argued that the present system of connecting the watercloset with the common sewer should be given up. The writer advocated the use of a Dry Closet (D. C. *versus* W. C.), wherein earth was used as a deodorizer. A model was exhibited.

Mr. John Carrick, Superintendent of Streets and Buildings, Glasgow, read a report on the

Drainage of Glasgow,

in the course of which he said;—

"In 1816 five miles of common sewers had been formed. At the present time there are sixty miles of sewers, nineteen miles of which have been formed since 1848.

All the sewers are, with one or two exceptions, of brickwork, varying in size from 2 to 5 feet diameter, and, since 1847, they have been constructed of an ovi-form or egg shape, the bottoms being formed to the curve of hewn freestone (which is plentiful in the neighbourhood) or moulded blocks of glazed ware, all set in hydraulic mortar or cement.

The water-closet has now become universal in the dwellings of the upper and middle classes, and also in the better description of houses for the working classes. At present there are no fewer than 13,000 water-closets within the city, in connection with dwelling-houses, and many of the factories and warehouses are provided with them.

The amount of drainage from the various manufactories, distilleries, chemical works, dye works, &c., is very great. Excluding the water of the Kelvin, it is estimated that 40,000,000 gallons of sewage are daily discharged into the Clyde.

The Clyde and its tributaries have become exceedingly foul and offensive in summer weather, and various schemes have been laid before the authorities having for their object the purification of the river and the profitable disposal of the sewage. Mr. Manning proposed to precipitate and deodorize the sewage. This scheme was reported on at great length by Dr. Anderson, Professor of Chemistry in the University of Glasgow, Mr. Bateman, of London, Engineer for the Water Supply of Glasgow from Loch Katrine. Experimental works were erected

by the Town Council, at a cost of several thousand pounds, near the outlet of a most noxious common sewer, and experiments were conducted under the direction of these gentlemen by Mr. James Napier, a practical chemist of great experience. The result of their investigation was embodied in a report addressed to the Sanitary Committee of the Town Council.

In the discharge of my official duties my attention has been directed to the improvement of the drainage of Glasgow, and the purification of the river; and I have proposed a plan for intercepting the sewage of the high levels of Glasgow at a height of 60 feet above high water, and conveying it five miles to the westward of the city, and applying it to the land by irrigation. There will be no expense for pumping, the whole scheme being carried out by gravitation.

A system of public water-closets has been adopted during the last few years, the contents of which are removed daily, and not allowed to pollute the drains and sewers; and the local authority is now enforcing the adoption of an improved ordure closet and refuse bin in various districts of the city, the general adoption of which will go far to ensure the comfort of the inhabitants."

The Rev. William Arnot read a paper on "The State of the River Kelvin in the neighbourhood of Glasgow," wherein the ludicrous and the horrible were mingled. Through the romantic valley of the Yarrow, he said, flows a stream of about equal value with the Kelvin. The manufacturers below have acquired the right and the power of strong water in the great natural basin of St. Mary's Loch, towards the upper part of the valley, in order to equalize this supply during a period of drought. For that purpose they diminish the flow during the night and the Sabbath, but a clause in the engagement firmly binds the parties to keep a certain amount of water always flowing, and never leaving the bed of the river at any part for a moment dry. Why? Because there are trouts in the stream, and every security is taken for preserving them alive. Ah! if we had trouts in the Kelvin, or if we who live on its banks were trouts, there would be a law binding all the millers on its borders to keep a perennial flow of water in its bed. The inhabitants of the west end of Glasgow might be addressed in the classical apostrophe, slightly altered in accommodation to circumstances, "Flesh, flesh! Oh, wert thou fishified!" But as only the lives of men and women are at stake we must take what comes.

Mr. J. Newlands read a paper on "The Sanitary Statistics of Liverpool." He adverted to the evils attendant on overcrowding of houses and the bad construction of houses—the result of a gross, if not a criminal parsimony. In Liverpool, in one very bad district, they had grappled with the overcrowding evil, though it had cost as much as 8*l.* per square yard. Having referred to the overcrowded state of certain districts in Liverpool, he detailed the means taken to lessen the evil, by means of house visitation by sanitary officers, who ordered cleansing operations. He exhibited a table showing the sanitary improvements which had taken place in this city within the last twelve years, together with its increase.

Mr. Bateman, C.E., described the difficulties which attended the drainage of Glasgow, and detailed how useful M'Dougall's disinfectant powder had been in deodorising the sewage of Carlisle, and also of Tavistock sewer, London; and said that at a cost of 5,000*l.* or 6,000*l.* the whole sewage of Glasgow could be purified for a year.

Dr. Lankester objected to trusting to deodorisation, but would rather have sewage kept out of rivers, and said that so bad was the Kelvin, that he would forbid any one connected with him from walking near its banks.

Dwellings of the Working Classes.

In the Department of Social Eeconomy,

Mr. H. Roberts read a paper "On the Progress and Present Aspect of the Movement for Improving the Dwellings of the Working Classes." He began by adverting to some of the recent Acts passed having reference to the improvement of the dwellings of the working classes; and then stated a number of facts connected with the condition of dwellings in Ireland, and showed that it had been estimated that there were no fewer than 135,589 single-room cabins in that country. He remarked that a great step had been taken in the right direction by Parliament, in having during last session voted 30,000*l.* for the accommodation of married soldiers. Mr. Roberts alluded to the operations of various building societies in London and various parts of the country, and dwelt on the advantages that had been derived from them, both financially and otherwise. In one instance, on an outlay of 13,200*l.*, in providing accommodation for about 125 families, there was a clear return of 5 per cent. He thought that, even for self-interest, the parochial authorities in towns ought to encourage the building of such houses. The number of new buildings of this description in London was but as a drop in the bucket compared with what the extent of its population required. He then referred to the improvements that had been made in the domiciliary arrangements of many persons in London, as the results of the efforts of the Female Domestic Mission, which was carried on by 130 agents, combined together to promote the physical, moral, and spiritual well-being of the lowest classes of the population.

Mr. Roberts afterwards gave "Examples of Efforts in Scotland to provide Improved Dwellings for the Working Classes." He said that his recent sojourn for a few days in the capital of Scotland, a city unrivalled for picturesque beauty, and remarkable for the classic elegance of so many of its modern buildings, had revealed to him what he had not seen on former visits,—a degree and extent of wretchedness which has enkindled more painful feelings than all that he had witnessed of a similar character during a long residence on the Continent. Even amidst all the misery and degradation which might be seen in the back slums of Paris, Genoa, Rome, and Naples, the vice of drunkenness rarely obtruded itself, and was certainly but to a very slight degree, as it was with us to a very considerable extent, both the cause and the consequence of the miserable state of the dens which so many human beings called their homes. Such a state of things was a reproach to our country and to our Protestant Christianity. The Pilrig Model Buildings, Leith-walk, were the first of that description erected in Edinburgh. The construction of these houses originated with a number of gentlemen who were accustomed to visit the district in which they were situated, with a view to the spiritual and the temporal improvement of the labouring classes. Besides these, there were in Edinburgh and its suburbs eight distinct blocks of dwellings, either completed and occupied, or now in progress; three belonging to associations, and five to individuals, one of whom was a lady of property. Mr. Roberts concluded by referring to the efforts that had been made in Dundee and Aberdeen, and stated that the financial results had been on the whole satisfactory.

Mr. James Salmon read a paper "On Working Men's Houses:"—

In the investigation of this subject it is difficult to point to any circumstance more aggravating and alarming than the fact, that the houses built for the working classes some fifty or sixty years ago, especially in the suburbs, were much better adapted for securing the health, comfort, and morality of their tenants than those generally erected now. To verify this fact, we have only to visit Bridgeton, Calton, Tradeston, and other suburbs, where the streets are wide, the houses two stories high, and behind each an ample court or green. Unfortunately, distinguished from this, we find, increasing in every direction, tenements of houses of four and five stories in height, besides sunk stories, with scarcely as much space around them as furnish a dim light to the tenants. Trying these two classes of houses by the test of square area, it will be found that these old suburban two-story tenements were so circumstanced as to provide each inhabitant with from 20 to 30 square yards of area, while many of the modern tenements too often provide little more than from two to four. As for many of the older portions of Glasgow, on both sides of the river, the census of 1851 revealed the startling circumstance, that the square area on which they stood did not admit of more than from one to two square yards of space to each resident. The importance of this fact as a test of health or salubrity will be better understood when contrasted with the square area which has been provided for the upper and middle classes of Glasgow. In the districts occupied by the upper classes we find from fifty to one hundred square yards, and in those occupied by the middle classes, from twenty to forty square yards provided for each inhabitant. Let even the worst house above ground in any wynd or vennel of Glasgow be removed to an open locality, where it can share the sun and wind of heaven, and it will be infinitely more healthy and desirable as a residence than the best provided house we have, if squeezed into some Gorbals or High-street close. Indeed, I am convinced that the whole of this great subject is bound up in the question of "space or area." Provide what other requisites you please for our workmen's houses, nothing will compensate for the want of light and air. With this knowledge it is lamentable, as already stated, to know how many houses for the industrial classes are still building on principles which set this law of existence at defiance. In England, a very large proportion of the labouring classes inhabit self-contained houses, each family having their own entrance and their own back yard. But what will our friends from the South think when we tell them that, on the space which answers for five or six of their houses, the people of Glasgow erect a lofty tenement to accommodate from sixteen to twenty-five families? What I aim at, in the first place, is to exhibit the erroneous principles on which in Glasgow the houses for the industrious classes have been blocked off and erected. Mr. Salmon here called attention to a plan upon the table, exhibiting four sections of dwelling-houses as they exist at present in four different localities of Glasgow. One was a dwelling-house of the upper classes in Sauchiehall-street; another a middle-class house; a third a working-man's house in Anderston; and another in Gorbals. For the first, for each inhabitant a space of 101 square yards was provided; for the second 48 yards; for the third 2 square yards; and for the fourth 1¼ square yard. This crowding of human beings into these breathless contiguities accomplishes its mischief in too many ways to be easily understood. Permit me now to refer to one or two of the causes which have led Glasgow into its present unfortunate position. As for the older portions of the city, it may be supposed that a good deal of the crowding arose from sheer thoughtlessness. This naturally brings me to refer to what has now become the great cause for this perpetuation of confined courts and narrow lanes, and this building up of five and six stories of human beings one above another. That cause is the high price of ground. At this moment in Glasgow, ground in what would be reckoned a convenient site for workmen's houses cannot be purchased at a less rate than from five to seven thousand pounds per acre. At that rate, if as much square space be allowed for each inhabitant as is absolutely necessary for the bare protection of health and morals, there would be imposed a mean yearly rent on each small dwelling of 3*l.* before even a single stone of the building was erected. The arresting and gradual healing of these frightful evils appear to me to lie chiefly in four directions—viz., in the efforts of philanthropy, in the efforts of speculative enterprise, in the efforts of extensive employers, in the efforts of the legislature. Speculative enterprise could do much, especially with the older portions of the city, where the plague is blackest. Extensive employers of working men could do much to assuage the evils. Requiring, as these great firms do, to erect their works in the suburbs, for the sake of cheap ground, what hinders them to purchase a few acres more than required for business, on which they themselves, or others for them, might erect houses for their workers? On ground costing from five to ten hundred pounds per acre, such employers could build workmen's houses, with everything necessary to insure health, morality, and comfort; and, while giving them to their workers at moderate rents, would realize a fair return for their invested capital. Let the conditions be simply these—"And be it enacted, That, after this date, all new houses erected for the accommodation of the industrial classes of the kingdom shall provide a superficial area of not less than seventy square yards for each individual house or dwelling, including the back yard and the half of the street; that not more than six families shall approach their dwellings by one entrance or one stair; that not more than one family be permitted to live in each house; that no family occupying a house of 10*l.* rent and under be allowed to accommodate lodgers without a license; and, finally, that each house, besides the living room and its adjuncts, shall contain three sleeping compartments, well aired and lighted by large wall windows.' Let such an enactment as that be obtained, and you will do more to stem the surge of demoralization which is sapping the health and morality of the people, than any other means which our humanity has the power to employ.

The Meeting of Working Men.

Wednesday evening was appropriated to this; and a most remarkable sight did the City Hall present, being crowded in every available spot with more than 3,000 earnest, attentive men, averaging as it seemed to us not thirty years of age. They were admitted by tickets at sixpence each, and, it was understood, represented no fewer than 30,000 who had applied to be present. Foreign gentlemen who talk about the invasion of this country should see and contemplate such meetings as this of our hard-handed sons of toil. It had been arranged that each resolution should be seconded by a working man named by the working men, and very able representatives they selected. The first resolution was proposed by Lord Brougham, who presided, and whose reception was tumultuous; and was seconded by Mr. Wilkinson, in a clear and forcible address. He said, at the commencement of it,—"We are asked by this resolution to perform two things, viz.—firstly, to give in our adhesion to the objects of this Association; and, secondly, to furnish facts within our reach bearing on the different social problems under discussion. In seconding this resolution I am anxious in the outset to impress the fact that this labour sought for will be productive of important results. There is one naked and imperishable truth that should never be lost sight of by the working classes, viz., that there is only one step between us and penury. Take health from us, and that step on which we rest is broken, and the chances are that we ourselves go to swell the numbers in the workhouse and our children to augment the ranks of the criminal population. But give us health—surround us with those sanitary influences that will produce strength of body and soundness of mind—and at the same time let our conduct be regulated by those great moral principles on which we are all agreed; and, with these essential auxiliaries, bad as the world is, and Heaven knows that to us, who have to fight its hard battles, it is bad enough; yet, notwithstanding its corruptions and its commercial and manufacturing competitions all working against us, give us health and moral rectitude, and with these two accompaniments, we are prepared to fight the battle of life successfully. One of the objects of this Association will be to stimulate the necessary means and exertions to build suitable dwellings in suitable localities for the working classes.

Much excitement was caused by the speeches of two French visitors, M. Garnier Pagés and M. Desmarets, both warmly eulogized by the president. Mr. Kinnaird, Dr. Lankester, Sir John Pakington, and Mr. Fawcett, of the members, and Mr. McFarlane and Mr. Cullen, of the workmen, also addressed the meeting.

Poverty and Disease.

In the Public Health Department, on Thursday, Mr. J. A. Easton, M.D., read a paper on this subject, not omitting, in showing its various bearings, the results of the huddling together and

the over-crowding found in the dwellings of the poor.

"It has been well remarked," he said, "that of all the circumstances affecting health none is so important as the condition of the air we breathe. On it, more than upon the food we eat, depend the purity of the blood and the right exercise of every function of the body. Let it be remembered, then, that in every portion of the oxygen which we breathe, in every breath that we draw, a nearly equal volume of carbonic acid gas is sent forth from our lungs; and thus, if dwellings be overcrowded and imperfectly ventilated, this deleterious gas corrupts the vital air of heaven. Hence the prevalence, in overcrowded localities, of typhus and other zymotic diseases. For it has been proved that, even with free ventilation, health and strength cannot be maintained in a space of less than from 700 to 800 cubic feet for each individual; and that to live and sleep in a space of less than from 400 to 500 cubic feet is dangerous to life, even though there be not, as there generally is, in our wynds and long narrow lanes—well-named *closes*—the superadded evil of extraneous noisome emanations. Now, when the 'abjects' literally 'gather themselves together,'—when ten or twelve human beings are huddled into a space which only two should occupy,—when each miserable occupant, instead of having 800, has only 90 cubic feet to live in and have his being,—can we wonder at the ravages of disease under circumstances so favourable to its propagation? In proof of the prevalence of disease in overcrowded dwellings, I submit the following facts:—The area of the city parish of Glasgow embraces 1,924 imperial acres, or about three square miles; and I have ascertained that, during the twelve months which ended on the 9th of August, 1860, there were 7,500 applications for medical relief among the necessitous poor who resided within the bounds just given. But the important circumstance is, that 1,592, or more than one-fifth of the whole applications, came from a portion of High-street, from Saltmarket, Bridgegate, New, Old, and Back Wynds, which cover about a fiftieth part only of the area of the whole parish. Now, by actual measurement, kindly made by Dr. Lindsay, one of the district surgeons, and witnessed by myself, it was found that the average space for each individual in some of those places just named was 90·5 cubic feet; and thus my own experience as a district surgeon, five-and-twenty years ago, confirmed by recent personal observation and the testimony of some of the district surgeons of the present day, attests that overcrowding still continues in these wretched localities, making them the hotbeds whence, during epidemic visitations, typhus fever may spread again, as it has often spread before, through the whole of Glasgow. No doubt there are other places, here and there, in which sanitary, as well as greater reforms, are much required: at the same time it is undeniable that the plague spots of Glasgow are concentrated in the district which I have just named, and that, on account of these, the whole city has been denounced for general insalubriousness. But, while I regret that there is in the midst of this great community so compact an aggregation of morbific agencies, and should rejoice at their removal, I ask if it be either just or generous to characterize Glasgow in the aggregate as pre-eminently insalubrious, when it can be proved to the satisfaction of every reasonable and unprejudiced person that small, circumscribed, and exceptional portions only deserve that unenviable distinction? But, even in these pestilential districts, improvement is visible; and, as this has resulted from what I conceive to be some of the modes of dealing with similar evils wherever they exist, I shall conclude this paper with a mere enumeration of a few of the remedies which either have been or might be applied. In the first place, the municipal authorities should exercise a vigilant supervision over all lodging-houses in the denser portions of large towns, and should insist that the space already spoken of as being essential to health and strength should invariably be provided. I am glad to notice that the police in Glasgow are attempting to root out this clamant evil, and that offenders have been brought to justice and punished. Further, an Act should be obtained, applicable to the United Kingdom, for regulating buildings, and for the breaking up of dense localities. During the last thirteen years the Corporation of Glasgow has been acquiring, destroying, and rebuilding on old and unsuitable property in some of the worst parts of the city,—slowly, no doubt, and to a limited extent,—but perhaps as well as the want of compulsory power and of a special rate will allow."

Drainage and Rivers.

In the Health Department, on Friday, Mr. Edwin Chadwick read a paper "On the Pollution of Rivers and the Economy of Sewage." Alluding to the charges brought against him in the House of Commons with reference to the system of sewage for London, and the use of the river Thames in connection therewith, the reader proceeded to explain the nature of his views on that question, applicable, as well, to all similar cases, and to defend the same against the propositions advanced by his opponents. By the adoption of the plans advocated by him in certain localities, he stated that the death-rates had been reduced one-third, and, in another instance, the pestilence, so well known in former times as the jail fever, entirely removed. While pursuing his investigations on the question of sewage, and before publication of his plans, he had had careful abstracts drawn out of those localities in the London district where epidemic diseases were most in the habit of appearing, from and upon which his report was founded. From these it appeared that notwithstanding the indignation of those who had raised such an outcry about the pollution of the Thames, it was immeasurably to be preferred, as a general system, that excremental matter should be at once carried off than allowed to remain till decomposition had commenced, under or contiguous to human dwellings. It was proved by statistics that the representations as to the noxious effects of the river had been very much overstated; as an example of which he would adduce the rate of mortality amongst Custom-house tide-waiters, whose life was almost wholly spent on or beside the river, as against that of the Guards in barracks, altogether away from such influence. In the former case, the rate was ten or eleven in 1,000; in the latter, twenty in 1,000. In his opinion, the fundamental principle in establishing a system of sewage was to have the excremental matter removed as rapidly as possible before decomposition or fermentation had set in; not, as under the old method, to allow it to remain to be carried off at some subsequent period. In concluding his paper Mr. Chadwick remarked that all plans for deodorizing sewage on a large scale had been found failures, and were now abandoned; and insisted on the necessity, according to his own theory, of its immediate and complete removal from human habitations.

We must now, however, hasten to a close, not stopping to speak of the *conversazione* in the Galleries, in Sauchiehall-street, where the corporation have a large collection of pictures, or the banquet in the City Hall, on Friday, which was brilliantly attended, and passed off with great satisfaction. Enthusiasm prevailed up to the close of the congress, and it may be hoped that what was said and done will not be without good fruit in due time.

CONCRETE BUILDING IN THE COLONIES.

Mr. B. H. Babbage having seen a notice of the concrete employed by M. Coignet (an imitation as we have elsewhere shown of an English process), and having occasion to enlarge a building in Australia, made trial of it, and gives the following as the result of his experience, which he thinks may be useful to others, especially in the colonies. He says;—

The internal dimensions of the concrete building I erected are 21 feet long and 8 feet 9 inches wide in the clear: the walls are 6 feet 9 inches high; and the roof consists of a concrete arch 9 feet 3 inches high at the crown. One of the sides is formed by the garden-wall, which is of cob, 15 inches thick, against which a lining of concrete, 1 foot thick, was built. The opposite wall is of concrete, 18 inches in thickness, as is one of the ends: the other end abuts against a cob building, which was also fortified by a thin wall of concrete. The concrete roof is formed inside with a pointed arch, consisting of two segments, 6 feet 9 inches in radius, the rise at the crown being 5 feet, whilst externally it is dressed off to a double slope, like a common roof. The thickness of the arch is 11 inches at the crown, 1 foot 10½ inches at the springing, and 6 inches in the thinnest part, which is at about two-thirds up. I have been particular in giving these dimensions, because no concrete roof of this form has, as far as I am aware, been hitherto constructed.

The foundations were dug out in the form of a trench, 18 inches wide and 18 inches deep, and filled in up to the surface of the ground with ordinary concrete consisting of one part of North Adelaide lime and seven parts of gravel and sand, taken from the bed of a creek. Upon this foundation a durable frame about 2 feet 6 inches high, and 10 feet long, similar to those used for making *pisè* work on the Continent, was fixed, the sides 18 inches apart, into which the concrete for the walls was thrown, and well rammed in layers of about 1 foot in thickness. This concrete was made according to the proportions adopted by Coignet, and was mixed in the following manner:—Seven parts of sand and gravel and three parts of common earth were mixed together, and formed into a ring, inside of which one part of unslacked lime was put. Sufficient water was then poured in to slack the lime and convert it into a paste. After being allowed to stand for an hour or so, the whole heap was thoroughly mixed together, and more water added if necessary, so as to make the concrete sufficiently moist to ram into all the corners of the frame. After being turned over with shovels it was thrown into the frame and rammed.

The concrete for the arched roof was formed of the same proportions as that of the foundations—namely, 7 of gravel and sand to 1 of lime, thoroughly mixed together in the same manner as the concrete for the walls. The ribs for the centres were made of 1½-inch deal, and were 4 feet apart, 1½-inch planks being laid upon them to receive the concrete, which was rammed in layers like arch stones, and brought to the slope of the roof outside with shovels. For economy, about 14 feet of the arch was built first, and the centres were then struck and shifted forward to build the remaining portion. The feet of the ribs were supported by wedges in order to allow of the centres being gradually eased.

That portion of the concrete of the walls which was made during the warm weather set sufficiently to allow of the frames being shifted on the following day; but, during wet weather, it was found necessary to leave them for two or three days. In order to tie the walls together at the angles, two pieces of 2-inch hoop iron, 3 feet long, were built horizontally into each wall at the corner, and were riveted to the corresponding pieces of the wall at right angles, making a kind of grid-iron in the angle: the further ends of the hoop iron were turned up for about an inch, to give them a better hold in the wall. Only one set of these ties were put in; but if I were making another building I should be inclined to put them in about every 5 feet in height.

The concrete of the arch, being made with a larger proportion of lime, set quicker than the Coignet's concrete, but I did not think it safe to stack the centres before three weeks had elapsed from the completion of either portion of the arch. On both occasions after easing the wedges and finding that the arch evinced no signs of any settlement, I proceeded at once to remove the centres.

It has been justly observed, that very often more is learned from a failure truly described than from a successful experiment; and, as my object in going into these details is to enable any one who may be inclined or obliged to become his own builder, I will proceed to point out the mistakes I made in not sufficiently supporting the middle portion of the centres, and in making the concrete for the first portion of the arch far too wet. Being accustomed to arches of stone and brick, in building which it is an object to key them in as soon as possible, so as to relieve the centres from a portion of the weight, I pushed on the concrete of the first 14 feet of the arch, so as to complete it in two days: the consequence was that the centres settled a little at the crown, and the weight of the wet concrete slightly pushed out the 18-inch wall, cracking it at the angle, and thus suggesting to me the use of the hoop-iron ties, which I adopted in the next portion I built. In settling, a slight crack was opened in the outside of the arch, at about 2 feet above the springing. A very few days sufficed for the concrete partially to set, and no more movement took place; but, as a matter of caution, before striking the centres, I built two concrete buttresses, 2 feet square and 6 feet high, against the 18-inch wall to support the thrust of the arch. The other wall, consisting of 15 inches of cob with 12 inches only of concrete, was not affected by the settlement, and I did not, therefore, build any additional supports to it. I believe that the 18-inch wall would have supported the arch very well without the buttress, but I was afraid to risk it in a first attempt. After the centres were struck, which was done in three weeks and a half from the completion of this arch, not the slightest appreciable settlement occurred. Warned by my experience with the first length of the arch, I took a week to the second one, and built hoop-iron ties, as above described, into the walls just below the springing. This portion of the arch was built during the wet weather, but it has set equally well with the first portion, and the centres were removed after standing the same time, namely, three weeks and a half.

The cracks on the outside of the arched roof were pointed with mortar made with blood instead of water, which set very rapidly; and a thin coat of common mortar was spread over the two slopes of the roof to make them smooth, which I intend to cover with a whitewash made of blood and lime, to enable it the better to resist the rain. The concrete arch was commenced on the 19th April, and completed on the 26th of May, and the centres finally removed on the 13th of June, so that it has had some very unfavourable weather to contend against; but, since the cracks were pointed, it has completely kept out all the rain. Both the concrete made with a mixture of earth after Coignet's receipt, and that made only of gravel, sand, and lime, have set very well, and promised with time to become as hard as a rock. I believe that concrete walls properly made, not the mortar walls used in Norwood, &c., are more solid and durable than the ordinary stone and brick walls in use in this colony, while a concrete roof has the advantage, not only of being fireproof, but of being, what is of great importance in this climate, exceedingly cool. In making larger buildings in this way I should advise the introduction of light iron tie-rods to assist the walls to resist the thrust of the arched roof, and I should

have no hesitation in making buildings of more than one story, in which case the floors should be made of a concrete arch with iron ties, and might be faced with cement and painted in oils in the Italian fashion so as to do away with the necessity for carpets in the hot weather. Concrete affords great facilities for introducing buttresses and other projections in building; and has, moreover, the great advantage of affording a surface to which stucco adheres so intimately as to become a portion of the wall itself, so that there is no danger of its peeling off as it sometimes does from a stone building.

In point of economy there is no comparison between concrete and other buildings. My walls cost 2s. 6d. a square yard for labour and materials, whilst for even a cob wall I paid 3s. 6d., and an 18-inch stone wall costs 8s. a square yard. The economy of a concrete roof is also striking. My arched roof cost 2*l*. a square yard, being less than half the expense of a shingle roof; and, of course, considerably cheaper in proportion than either iron or slate. I should, however, state that I did not take the expense of the wooden frames, or the centering, into the calculation, as the same ones might have been used for a dozen other buildings. I should also mention that I had only half a mile to go for sand and gravel; but, on the other hand, as a set-off, I had to send six miles for the lime.

Settlers at a distance from towns, who find it difficult to procure skilled workmen, I strongly recommend to try this economic building; and even for stations in the Bush when, as often is the case, limestone is to be found. Concrete buildings would be nearly, if not quite, as cheap, as log huts; and, whilst being infinitely more comfortable, they would, being fire-proof, set at defiance all the attempts of the blacks to burn them, and thus, in case of an attack, enable their inmates to hold out until help arrived: in fact, to parties about to build, I say, try concrete.

MR. HERBERT INGRAM AND ILLUSTRATED LITERATURE.

Of late the hand of death has fallen heavily on men of mark in many walks. Some have dropped with great suddenness, and the public have been startled and surprised. In no instance, however, do we remember a more painful impression resulting than that which has been caused by the accidental death, on Lake Michigan, of Mr. Herbert Ingram, the well-known originator and successful proprietor of the *Illustrated London News*.

Mr. Ingram's career is encouraging to those beginning life; and he is worthy of honourable mention, as well for the good which he has done in advancing illustrated literature for the multitude, as for the energy and perseverance that distinguished him.

In 1811, Mr. Ingram was born in a humble home in Boston, in Lincolnshire. Here he received a useful amount of education, and was then apprenticed to a general printer. In that position he would be more likely than in a large metropolitan establishment to get a knowledge of the various branches of his business,—an advantage felt by many in this and other trades who are brought up in the provinces. On finishing his apprenticeship he removed to Nottingham, where he commenced business as a printer, bookseller, and newsagent. In the news department of a comparatively small but thriving establishment Mr. Ingram showed activity and judgment, and he managed to supply periodicals with a quickness which sometimes surprised his neighbours.

This shop brought him a certain amount of prosperity; and, in course of time, Mr. Ingram was induced to embark in the manufacture of a patent medicine—a "life-pill,"—by which somewhat questionable means a large sum of money was made with extraordinary rapidity. While thus engaged, the idea of an illustrated newspaper, originating, it is said, in the success which had followed an illustrated handbill, was conceived, and the idea of it so matured, that, on the 14th of May, 1842, upwards of eighteen years ago, No. 1 of the *Illustrated London News* made its appearance, mainly with a view, originally, it has been asserted, to assist in making popular the life-pill. Much diversity of opinion was expressed respecting this venture, but at the time many thought that it must end in failure. Artists of skill were difficult to be had for the execution of the subject needed; and, as we have before said when alluding to the growth of our periodical literature, boxwood of sufficient size was not to be readily obtained: the system of steam-printing, too, was not then so perfect as it is now, and there were no organised means of obtaining sketches of events from distant parts of the country or from abroad.

In a well-written announcement in the first volume of the *Illustrated London News* it is stated that it was "determined to pursue the great experiment with boldness, and to associate principles with a purity of tone that may secure and hold fast for the new journal the fearless patronage of families,—to seek in all things to uphold the great cause of public morality,—to keep continually before the world a moving panorama of all its actions and influences."

It is curious to refer to the commencement of attempts which have led to success, and it is with interest we look at the illustrations of the first number of this periodical. On the front page is the same heading which is still used, and a small ill-executed view of the great fire at Hamburgh: the fashions of the day are ill-given; and, over the heads of various kinds of intelligence, are emblematical designs: the police reports are illustrated with rather coarse and humorous designs: there are besides some rather rough comical cuts with appropriate letter-press: on the last page there is a view of 200 men passing the Bank of England carrying placards announcing the publication of the "*News*." A marked improvement may be seen in each week's cuts: they become larger in size, and more bold and spirited in execution. A *bal masqué* given by the Queen and other events were well engraved: notwithstanding, however, the sale did not advance; and the writer has been told that so greatly had Mr. Ingram's resources been exhausted, that it was feared it would be necessary to stop the publication. Mr. Ingram was, however, strongly impressed with the idea that there was no staying the advance of art into all the departments of our social system. It had begun in a few isolated volumes, stretched itself over fields of natural history and science, and penetrated our general literature. At one plunge it was in the depth of the stream of poetry, working with its every current, partaking of the glow and adding to the sparkling of the glorious waters, and so refreshing the very soul of genius, that even Shakspeare came to us clothed with a new beauty, while other kindred poets of our language seemed as it were to have put on festive garments to crown the marriage of the Muses to the Arts. Then it walked abroad among the people, went into the poorer cottages, and visited the humblest homes in cheap guises—and, perhaps, in roughish forms,—but still with illustrative and instructive principles strongly worked upon and admirably developed for the general improvement of the human race. Lastly, it took the merry aspect of fun, frolic, satire, and badinage, and the school of the *Charivari* began to blend itself with the grave *pabulum* of Penny Cyclopædias and Saturday Magazines. He, therefore, persevered; and, on the occasion of the Queen's first tour in Scotland, so great was the general enthusiasm and so novel were the illustrations, that a great demand was created, and from that time the publication might be said to be firmly established.

Although not endued with a very great or refined knowledge of either art or literature, Mr. Ingram had the faculty of selecting what was interesting to the general public. He was liberal in his treatment of those whom he had occasion to employ, and strictly punctual in his arrangements with artists and others. This and the advancing reputation of the publication made the supply of news and sketches more regular: Mr. John Gilbert (who did much to advance the paper) and other artists of ability were employed, and no cost was spared in sending competent persons to places where extraordinary events were occurring.

During the long period wherein Mr. Ingram kept the management in his own hands, he showed that perseverance which is so often the means of success, in very distinctly keeping his publication to the illustration of the passing events of the day. Respecting the correspondence, he was carefully particular; and in the production of fine-art blocks which had a seasonable interest he did not begrudge any expense.

As the circulation of the *Illustrated London News* grew, Mr. Ingram showed much administrative ability in the arrangement of his now extensive establishments. Old buildings were purchased, demolished, and rebuilt in a substantial form: powerful engines of the best description were purchased; and the whole business was arranged with remarkable regularity. In the midst of this success Mr. Ingram showed the praiseworthy wish to stand well in the estimation of the dwellers in his native place. He purchased land in the neighbourhood, fostered useful institutions, directed attention to sanitary matters, and used surprising exertion in improving the railway communication of the town of Boston and the neighbourhood.

In 1852 the electors of Boston did credit to themselves and honour to him who, as the schoolboy and printer's boy, had so often, in simple guise, unnoticed and undistinguished, rambled through their streets, by sending him to represent them in Parliament. In 1857 he was again returned without opposition. Moreover, Mr. Ingram was appointed a magistrate of the county of Herts, where he had considerable property; chairman of the Boston and Sleaford Railway; and deputy-lieutenant of the county of Lincoln. To such distinction had Mr. Ingram arrived by diligently and with energy pursuing a straightforward and useful course.

In future histories of self-made men Mr. Ingram's name will take a prominent place; while his sad fate, at the age of forty-nine, when fortune and position were realized, and he was regarded as one of the "lucky men" of the day, may be made to point a moral, and teach moderation in success and contentment with apparently bad fortune.

REPORT OF FALL OF IRON FOOT-BRIDGE IN MANCHESTER.

We mentioned last week the fall of an iron foot-bridge over the Rochdale Canal. At the inquest held on Wednesday, the 26th ult., Mr. E. T. Bellhouse, of the Eagle Foundry, Manchester, read the following report:—

"Agreeably with instructions received yesterday, I have carefully examined the foot-bridge which crossed the canal at Prussia-street, Islington. The clear span of the bridge was 37 feet 6 inches, in addition to 3 feet 6 inches which was taken up by a projecting mass of masonry connected with the stone steps on one side. The width of the path was 3 feet 6 inches. The bridge consists of two compound trussed girders, of cast and wrought iron, which form the railing or parapet on each side of the path. The structure has been in existence a long time, and was designed at a period when the construction of iron girders was not so well understood as it is now. The combination of wrought and cast-iron trussed girders was proved to be bad in principle at the time of the fatal accident which occurred on the railway near Chester, from the failure of a trussed iron girder bridge. In the present case the construction is decidedly faulty, inasmuch as the cast iron is in tension and the wrought iron in compression, whereas the very opposite should be the case with these materials. The corrosion of the wrought-iron uprights near the bottom materially weakened the girders, as the great majority of them were completely rusted away. These uprights formed the suspension bars, by which the pathway of the bridge was hung to the wrought-iron curved pieces, so that, by their being rusted away, the very principle of the trussed girder was destroyed. When originally made, the bridge might have been strong enough to bear the heavy test to which it was subjected at the time of the accident; but, in its corroded state, it certainly could not have been expected to bear such a test. The overhanging masonry from which the bridge commences on one side is decidedly objectionable. At the time of the accident there may have been a weight of ten tons distributed over the surface of the bridge. This would be equal to a weight of 2½ tons on the centre of each compound trussed girder. I should consider half this weight sufficient load for the girder in its original state."

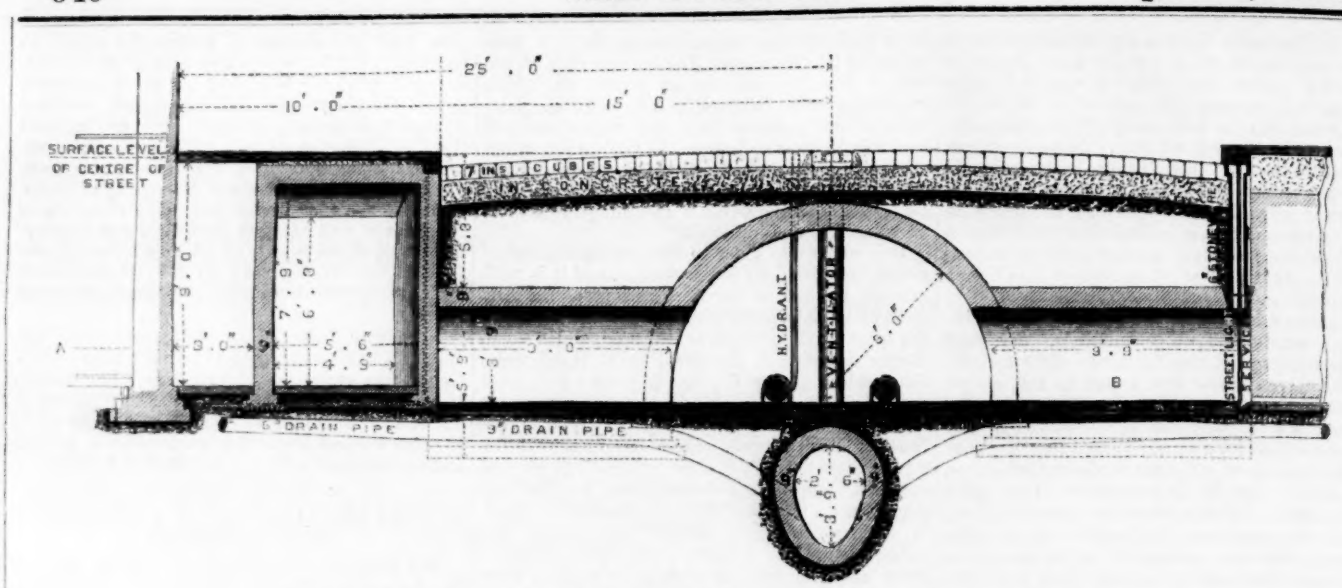
The jury, after a few minutes' deliberation, returned a verdict that the cause of death was accidental; at the same time suggesting that the Rochester Canal Company should replace the bridge by one on an improved principle.

THE PUBLIC HEALTH.

By the Health Act of 1858 the Privy Council are empowered to cause inquiry to be made, when they see fit, in relation to the public health in any place; and a medical officer, Mr. Simon, is attached to the Council, and superintends such investigations. His report of the proceedings of 1859, which has recently been issued, deals with several subjects of great interest. Among them is that which has still to be called "the Thames nuisance."

In a paper communicated by Mr. Ord, that gentleman describes the symptons of a poisoning of the nervous system which occurred very generally in the summer of 1858 among persons employed upon the river, and observes that in 1859, when extensive disinfecting operations were carried on at the mouths of sewers, the sulphuretted hydrogen gas was not in proportion sufficient to the production of the symptoms; and he remarks, that if the emanations of a river in so foul a state do not actually originate disease, and, on the other hand, percolations from cesspools into the soil and wells is proved to be highly injurious, then even this stage in the process of purifying London must be accepted as an improvement upon its previous condition. The putrefactive matter, instead of abiding in a thousand places as a focus of disease, is brought into one large aggregate, where it may be more readily submitted to disinfecting processes, and where it finds in the water of the receiving stream elements which appear to disarm it of much of its destructive influence. Happily this source of disease is destined in a very few years to a much more complete banishment.

The state of "the diarrhœa districts of England



THE SUBWAY IN THE NEW STREET TO COVENT GARDEN.

is one of serious import. Dr. Greenhow was commissioned last year, as a temporary inspector, to inquire into their sanitary condition. The towns selected were Coventry, Manchester and Salford, Nottingham, Birmingham, Dudley, Leeds, Wolverhampton, and Merthyr Tydfil. In all of them Dr. Greenhow found it coincident with one or other of these two circumstances—the habitual drinking of impure water, or the tainting of the atmosphere with the products of organic decomposition, especially of human refuse. In other words, in the districts which suffer from high diarrhœal death-rates the population either breathe or drink a large amount of putrefying animal refuse. He traces street by street, showing how diarrhœa, visiting cleanly districts but slightly, is especially grouped round those spots where there is an accumulation of nightsoil infecting the air in the midst of a dense population, or so placed that the exhalations penetrate into the houses, or can be but slowly dispersed into the general atmosphere. The comparative immunity of other districts resembling these in all respects, save the absence of this fœcal impurity, is found to be so constant, that it seems impossible not to admit the relationship as one of cause and effect; and the medical men affirm that diarrhœal disease is not only more prevalent, but also more unmanageable, in ill-conditioned places. Dr. Greenhow remarks that the occurrence of epidemic epochs may arise from peculiarities of season giving greater efficacy to local causes, or possibly from the products of decomposition at such periods being different from those at ordinary times. How preventible this disease commonly is may be judged from the success of sanitary improvements in almost all those very districts in reducing the local prevalence of diarrhœa. But, though much has been done, the report shows that it is very far from enough; and it may surely be hoped that the authorities of these towns will take means for removing from their administration "the reproach of preventible but unprevented disease."

THE SUBWAY IN THE NEW STREET FROM CRANBOURNE-STREET TO COVENT-GARDEN.

The Metropolitan Board of Works have published the plans for the subway in the new street to Covent-garden (commencing at the junction of Long-acre and St. Martin's-lane), which were prepared for them by Mr. Marrable and Mr. Bazalgette, their architect and engineer. We have already briefly described the work as in progress, and now give an engraved section that will sufficiently illustrate it. The following report accompanies the drawings:—

"Having been directed by the Committee on New Streets to prepare a design for a subway under the new street leading from Cranbourne-street to Covent-garden, in which the pipes and mains for gas and water might be laid in such a manner that easy access could be had to them at all times without disturbing the surface or roadway, we now beg to submit the accompanying plans, which we believe to embrace all the desiderata of such an arrangement in the simplest form and at the least possible expense. The plan consists chiefly of a central continuous passage or subway, extending the whole length of the new street, of sufficient dimensions (12 feet by 6 feet 6 inches) to admit of the deposit of any requisite number of gas and water mains, with ample working room for alterations, additions, or repairs. Under the centre of this passage runs the sewer, to which means of access by man-holes are provided at convenient distances, as also ventilating shafts, gullies, &c. Side-arched passages communicating with the central way will be constructed between every two houses, in which the service-pipes will be carried from the mains into the open areas in front of the houses, and open channels will be left in the footings of the walls dividing the house-vaults, through which the service-pipes will be passed, without any interference with the structural arrangement, and these channels although of small dimensions (4½ inches by 3 inches), being always left open, will act as drains for the admission of air from the open areas into the central passage, which, in conjunction with ventilating shafts at convenient distances into the roadway, will secure an ample current of air for all the purposes of ventilation. An entrance to the main passage will be provided in Rose-street, similar to the ordinary side entrances, but of such dimensions as will allow of the ready admission of the main pipes for gas and water, which, as all the service pipes will be laid in sunken channels, can be readily carried to any required point on a small truck kept in the subway for the purpose. Provisions have also been made for the hydrants or fire-plugs, and for the service of the street-lamps, but these are matters of detail which would doubtless be subjects for final arrangements with the different companies.

Careful estimates have been prepared, showing the cost of the private vaults to the houses, the paving of the foot and carriage ways, and the cost of the ordinary sewer, including digging, side entrances, ventilating shafts, gullies, &c., by which it appears that the extra cost of constructing the subway as now proposed will not exceed 2*l.* 0*s.* 11*d* per foot run, or about 1*l.* per foot frontage on each house, which, together with the cost of the vaults, sewers, and road, might either be charged at once on those taking up the ground-rents, or be added as an annual charge, in addition to the ground-rent, and which would of course form a part of the annual rental to be sold when the Board should think fit to realize the ground-rents. The estimates in all cases are given at so much per foot run on the frontages, so that the charge on each house may be seen more readily."

It will be remembered that premiums were offered by the Board for the best designs for a subway, and we may conclude that the plan adopted was the result of careful consideration of all that were submitted.

The following is the estimate given:—

	Quantity.	s. d.	s. dec.	£. s. d.
SEWER.				
Excavations, Carting away, &c. ..cubic yds.	0·42 @	2 6	1·05	
Brickwork .....cubic ft.	4·66 @	0 11	4·27	
Junction Blocks, 9-in.pipe	..	..	0.06	
				0 5 5
SUB-WAY.				
Excavations, &c., cubic yds.	2·273@	2 6	5 98	
(Central Passage) Brickwork .....cubic ft.	13·160@	0 11	12·06	
Excavation, &c. cubic yds.	0·306@	2 6	0.76	
(Side Passage) Brickwork cubic ft.	2·140@	0 11	1.96	
				1 0 5
CELLARS.				
Excavations, &c. ..cubic yds.	3·535@	2 6	8·83	
Brickwork .....cubic ft.	22·930@	0 11	21·02	
Pitching (brick on edge) sq. yds.	0·525@	3 6	1·84	
Paving, area 2½ flag sq.yds.	0·324@	4 10	1·56	
				1 13 3
FORMING OF STREET.				
Excavations ..cubic yds.	1·02 @	2 6	2·55	
Concrete .....cubic yds.	0·83 @	6 0	4·99	
7-in. Granite Cubes sq.yds.	1·65 @	16 0	26·56	
Kerb ..... cubic ft.	0·25 @	5 0	1·25	
2½ Paving .....sq. yds.	0·665@	4 10	3·21	
3-in. do. .....sq. yds.	0·103@	5 7	0·57	
				1 19 2
Add proportion for Side Entrance, Ventilators, &c. &c.				
Per foot run	..	..	..	0 1 6
Total cost per foot run of frontage.....	..	..	..	£4 19 9

THE "PROMOTER" LIFE ASSURANCE OFFICES, FLEET STREET.

These premises occupy a plot of ground, No. 29, Fleet-street, about 20 feet broad by 50 feet deep, and the rear is in close proximity to the Temple Church. The front is executed entirely in Portland stone, excepting where enriched by polished granite and marble.

On the ground floor there are three openings in the front, two of which are the windows of the public office, and the third (which is the western) the doorway: these openings have stone arches, supported by four red granite columns, which stand on Portland stone pedestals; and between these pedestals are the basement-windows: the capitals of the granite columns are each carved in a different design, one being the grape, another the hop, and a third the rose. The spandrils of the arches are filled in with green marble and red granite, in patterns, the key-stones being bunches of fruit and flowers, which hang over a dentilled string above the ground story, at the ends of which are carved lions' heads. Over this string are three elliptical panels: the outer ones are filled in with red granite, and the middle one with green marble, upon which are carved the name of the office, and the date of its establishment (1826): between these panels is a band of red granite, with diamond centres filled in with marble.

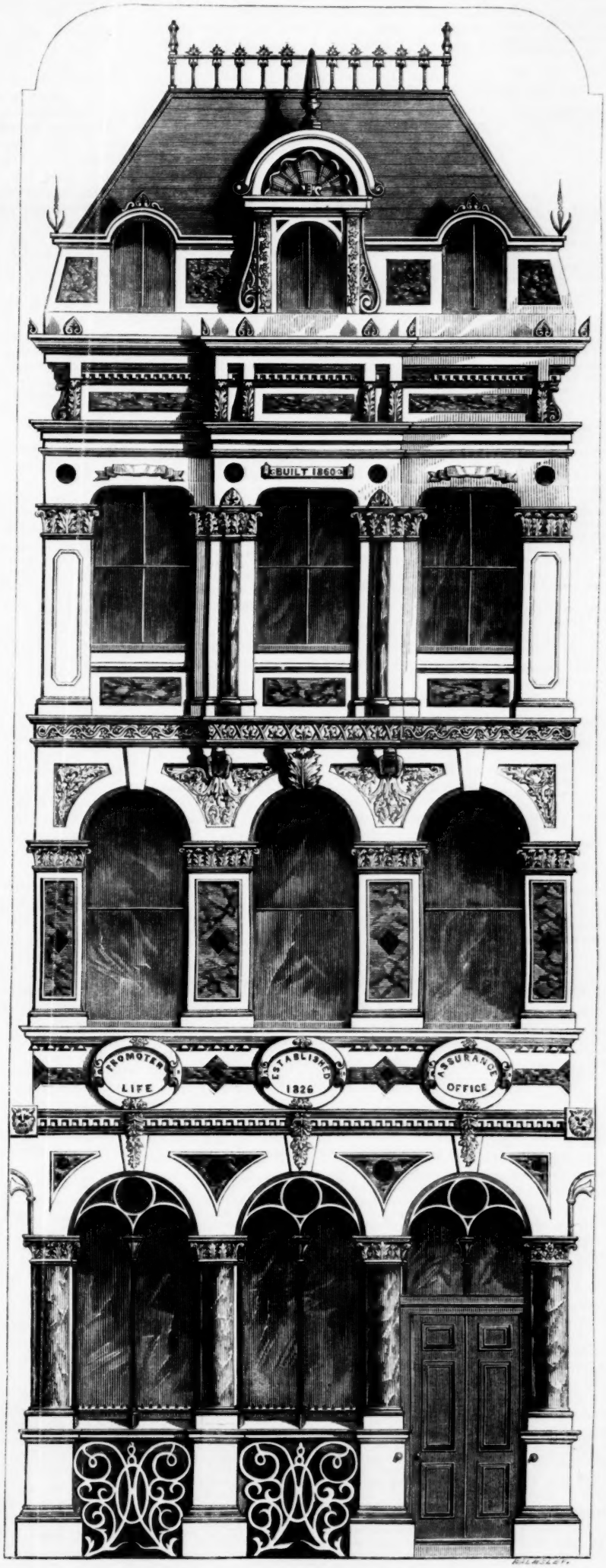
The first-floor openings are divided by stone pilasters, the panels of which are red granite, with green marble diamond centres. The capitals of these pilasters are also all of different design. The arches of these openings are Portland stone, and the spandrils elaborately carved: two of the key-stones are quite plain, and the centre one carved. The sill over first-floor window is supported by two carved figures, projecting forwards.

The openings in the second floor are divided by pilasters, the two end ones being panelled; and in front of the two centre ones stands a slender red granite column, above which are carved bands bearing the date of the erection. Above these is a frieze, upon the string course of which stand consoles, and carry blocks, which form part of the principal cornice, and between these consoles are panels of red granite, set projecting. Above the cornice are the attic windows, between which are slabs of red granite. These windows are arched over,—the capping continued over them: the centre window, which projects, has a cornice and circular pediment, in which there is a carved shell, and in the centre of the pediment is a finial.

The entrance lobby is paved with encaustic tiles, and communicates with the stairs, and by a door to the public office, the sides of which are ornamented by pilasters with enriched caps and frieze. Behind is the secretary's office. The ground floor is constructed of Fox & Barrett's fire-proof flooring. In the basement is a living-room, with a bedroom in the rear; and in the front are lavatories, &c. for clerks, while in the centre is a fire-proof room.

On the first floor is the board-room in front, and doctor's room and lavatory are at the back.

The architect of this new building is Mr. W. G. Bartleet, and the builder Mr. J. Willson, of Southwark. The work has been carried out by Mr. Allen, the clerk of works. The carving has been executed by Mr. Forsyth, under the superintendence of the architect.



THE "PROMOTER" LIFE ASSURANCE OFFICES, FLEET STREET.—Mr. W. G. Bartleet, Architect.

APPRENTICESHIP TO TRADES.

Looking at a large number of important manufactories and other works in town and country, a great change will be found to have taken place in respect of the training of apprentices to the different branches of trade.

Formerly, in nearly every establishment it was the custom to take a number of apprentices in proportion to the men engaged. This arrangement differed in various trades. In blacksmiths', brass-fitters', cabinet-makers', and other shops in which works were carried forward on an extensive scale, the boys were distributed amongst the men, who for a certain payment taught them their business. Now, however, it seems that, in some of our chief establishments, where hundreds of skilled workmen are engaged, no employment is afforded for apprentices.

At Maudslay & Field's there are no boys: at Messrs. Pellett's glass works, neither in the cutting-room nor in other parts are there apprentices. Thirty or forty years ago there would have been a large number. In carrying forward great building operations, amongst carpenters, bricklayers, and stonemasons, particularly in the metropolis, scarcely a boy is to be seen; and it would be easy to mention a hundred other instances of this remarkable change.

Year after year works are increasing in extent, and small workshops are becoming more scarce. This naturally raises the question as to how a supply of skilled workmen is to be kept up, and it is also a question what is to become of the boys? This is now a difficulty among the working classes and persons of limited income who have a number of children. From the ages of thirteen to sixteen there are various ways in which boys can get employment which enables them to earn from 5s. to 6s. or 7s. a-week. The nature of their occupation,—work in printing-offices, potteries, filling situations as errand-boys, &c. &c.,—does not fit them with the means of gaining a livelihood after they have ceased to be boys; and it is owing to this that so many youths, just at the time when their labour ought to become of greater value, are thrown out of work: the skill they have acquired is useless to them: fresh boys are coming into the field with the same miserable prospects.

Although this phase of our present social system has not met with much attention, it is of vast importance, and must, before many years have passed, cause much difficulty and lead to much mischief. It demands the consideration of all who are interested in the matter.

MANCHESTER WAREHOUSE ARCHITECTURE.

We have often asserted that there are duties, that there is a responsibility, incumbent upon all, both as regards the cultivation of their own perceptions, and their influence upon the tastes of others. And we rejoice that this belief appears to have spread beyond the ranks of artists to others who are quite as important in their place—the capitalists who employ their money in building. The *Manchester Review* on this head says,—"Our mercantile and manufacturing towns have till lately concentrated within themselves almost everything that could make human habitations repulsive. The lowering smoke, the sulphurous air, the river blacker than Styx, the dire array of coal wharfs, the endless lines of scoty brick, are features more or less common to them all. Yet why should the same spirit of trade, which has conjured up places of beauty on the shores of every sea, encumber England with so much unutterable ugliness? No doubt the circumstances which surrounded business in Venice, Milan, or Florence, were very different from those by which it is attended now. Trade is no longer in the hands of exclusive guilds, or mainly controlled by a few wealthy and educated merchants. It cannot now be conducted without generating volumes of smoke, which reduce all things in heaven and earth to one dingy funereal hue. And, above all, the economy of space and material, enforced by the pressure of competition, might seem to forbid the pursuit of any enterprise loftier than the desperate scramble for existence. But we have already ample proofs that these difficulties are not impossibilities; and we rejoice at the unmistakable signs of a better spirit which may now be observed in our streets. We cannot, indeed, undertake to maintain the correctness or good taste of all that has been done; but there is, at all events, an effort in the right direction; and, in some cases, not always in those of greatest pretensions, considerable success has been achieved. Even if we are to look upon some of these warehouse fronts as only equivalent to the ornamental and fantastic advertisements which are thrust before our eyes everywhere in these days of competition, we should hail with pleasure the spreading conviction that, on the whole, it will pay better to show some respect to the desire for beauty, which we all share more or less, than utterly to set it at defiance. But though such a feeling undoubtedly has its weight, yet we cannot believe it altogether excludes a higher motive. Let us hope that, as Manchester merchants have never been slow to recognise their responsibility for the vast influence which their commerce exerts upon the world at large, they have begun also to feel that no one has a right to use his capital for the purpose of encumbering the world more immediately around him with monstrous forms of ugliness. This is the position which we should like to see more generally taken up. Surely if, as we are assured on high authority, eating and drinking may be done to the glory of God, there is nothing very extravagant in the idea that any one who overshadows a public street with a pile of buildings ought to feel some responsibility for its effects upon passers-by. What right have half-a-dozen rich capitalists to drive us melancholy-mad by hedging up our way with their acres of dirty brick-wall? What right have thriving traders to insist that the increase of our misery shall be commensurate with the increase of their business? Yet this must necessarily be the case wherever a city is swallowing up the country round, unless the men for whom the city mainly grows feel some responsibility for the sights by which they surround us. We rejoice, therefore, that better ideas than of old are manifested in the warehouses of Manchester." We have often before spoken of these buildings.

"AN ADDRESS TO BUILDING OPERATIVES AND WORKING MEN OF THE WEST RIDING."

Under this title John Plummer, of Kettering, believing that it is "the bounden duty of every person, no matter what may be his station in life, who may possess any experience or information relating to the questions at issue, to speak out frankly and boldly, so that the expression of his honest opinions and convictions may aid the endeavours of those who seek to devise some method of preventing" the repeated contests between labour and capital, or mitigating the baneful influence which they have so often exercised in our attempts at social progress, has issued another little pamphlet, which deserves the consideration of his fellow-operatives.*

Speaking of the nature of the relations which subsist between the employers and the employed, he says:—

"Nothing is more common than the error that the employers can regulate the rate of wages at will, or that they can alter the established customs of a trade at their own pleasure; consequently, the men, as a rule, deem it but just that they should curtail their power as much as possible; and, where practicable, *dictate* the rate of wages, hours of labour, &c. The men have a perfect right to state on what terms they will work for the employer, and the employer has an equal right to accept or refuse those offers. But if others are willing to work for the employer, on the terms refused by them, then they have no right to interfere farther; otherwise they are guilty of injustice and wrong. Labour is a marketable commodity like anything else, and is worth what it will fetch in the market, and no more. Some kinds of skilled labour may be worth 60s. per week, while other descriptions may be dear at 10s.; but that is no reason why the purchaser of the labour at 10s. should be censured for not giving 60s. for it. Suppose that the grocers of Leeds are selling sugar at 5d. per pound, and they take it in their heads that this is too low a profit, considering the risk and labour involved in the retailing of it, and that they accordingly raise the price to 6d. per pound. What an outcry would arise against them! Well, suppose again, that the purchasers of the sugar, feeling dissatisfied with the increased price, encouraged some tradesman to procure a hogshead of sugar, and sell it at the original rate, and that the combined grocers, hearing of the circumstance, 'struck' selling any articles to their customers until they refrained from purchasing of the cheap sugar dealer. Would not the working men of Leeds and the West Riding be the foremost in denouncing such conduct as tyranny and coercion, and hold up to public execration the names of the combined grocers? Yet what is this but the very principle of the present strike amongst the masons of Leeds? The grocers have a perfect right to place any price, say 5d., 9d., or 1s. per pound, on their wares, but they have no right to coerce the public into buying at the increased rates; and the same principle applies exactly to the purchase of labour by the employers. The price of the sugar is regulated by the state of the market: if the stock of sugar be small the prices will be *high*; and if the stock be large the prices will be *low*. If the wholesale price of sugar be *fivepence* per pound, and the grocer sells it for *fourpence*, he will soon find himself on the road to ruin, for all his dealings will be conducted at a loss. Should the wholesale price rise to *sevenpence* he will not sell so much as formerly, because the *increased* price will lessen the demand for it. The same with labour. If the employer gives an increased rate of wages, without raising the price of the labourer's produce, his profits will fall in proportion; and if he *does raise* the price of the produced article, the demand will diminish in exact proportion to the increase of price, and a less amount of labour will be employed."

On the question of *piece-work* the writer says:—

"We shall have to ascertain whether piece-work is injurious or not to the interests of the operatives. If it is not, then there is an end of the question; and if it is, then we must inquire into the advisability of a strike for the remedy of the same. In paying for labour performed, it will always be found that, as a rule, the industrious men will receive more wages than the indolent. 'We may suppose the labourers to be paid for their work by the piece, or by the day. If by the piece, it must be clear that those who do most work will receive most wages; if by the day, those who work the larger number of days will receive more than those who work the smaller. Or, if, while each laboured the same number of days, some, by greater assiduity, executed more and better work; so soon as this difference was clearly ascertained, the effort among the capitalists to secure the services of the most efficient workmen could not fail to establish a difference in their wages.'* Now, what the masons desire to establish at Leeds, Halifax, and elsewhere, is a uniform rate of wages and hours of labour: so that the industrious and skilful operative shall receive no more than the indolent and unskilful. Now it is not reasonable to suppose that an industrious man will care about labouring so hard as the less industrious one, if there be no difference in the amount of wages received by both. Consequently, the quantity and quality of the work performed will deteriorate in proportion to the attempted equality of wages. Good labour will always find a good price, if there be any market for it. The great objection of the employed to piece work is, that it tends to cheapen work—that a man who made by time work two articles for a penny, would, under the piece-work system, have to make three for the same price. Now is this belief really based on fact? Does the extension of piece-work tend to cheapen wages? I believe that, with a few exceptions, it does not do so, and I will quote the words of Mr. James Howard, the agricultural implement manufacturer, of Bedford, from a lecture delivered by him at Northampton. He says—'I like the system, as it enables the workman to obtain higher wages, and the master pays for no more and no less than is done. I never had any difficulty in letting a job by the piece. I hear there are difficulties in other trades, but I think they would vanish when the system came into operation. It is worthy of remark and consideration that those trades have made the greatest progress where piece work is the rule. It gives the industrious and skilful man a great advantage over the lazy and unskilful one.' And such is the result of my own experience. I generally find that, as a rule, where time-work is used, the industrious worker has to pay for the loss occasioned by the employment of the indolent and incompetent; and that it is the inferior workmen who, as a class, desire time-work; while the superior men prefer to labour by the piece. Possibly the increased skill of an intelligent and industrious man may occasion him to produce articles at a quicker rate than formerly, and that he, consequently, may be enabled to do them a little cheaper, so that, by the increased demand, he may be enabled to increase the net total of his weekly earnings; but this does not operate more injuriously—allowing such to be so, which I do not admit—on the interest of the employed, than does the practice of time-work.

Should the men persist in refusing to accept piece-work, then employers at a distance, labouring under no such restriction, would be tempted to accept the proffered contracts, and send their own men to perform the labour lost to the others. The enforcement, therefore, of the rule, 'That piece-work and sub-contracting be abolished,' would tend to seriously cripple the trade of Leeds, and to inflict much suffering and misery on the operatives."

* Kettering: Thomas Waddington, Printer, High-street.

THE WESTHAM DISTRICT SEWERAGE WORKS.

A report recently made by Mr. Rawlinson states that the whole of the works comprised in the original plan have been let, and are either completed or in hand. The annexed statements show the particulars and cost of works finished, and the particulars and estimated cost of works remaining to be done. The sewers throughout the district have been designed with a view of obtaining the best practical gradients, more especially for tributaries. In some cases, however, it has been necessary to lay the mains with a fall of not more than 1 in 3520, or 18 inches per mile. All sewers terminate at the least practicable depth to ensure proper falls for house drains. A system of ventilation has been adopted which prevents the road dirt falling through the ventilating-grates and impeding the flow in the sewers. An intervening screen, filled with charcoal, filters all the sewer gases, so as to render them innoxious. The outlet sewers in Canning-town have been laid level, to allow of their being used as depositing and deodorising tanks.

There are 27,311 yards, or about 15½ miles of public sewers completed,† varying from 5 feet 3 inches by 5 feet 6 inches, to an earthenware pipe of 9 inches in diameter. The cost of such sewers, including manholes, lampholes, junctions, &c., has been 38,064*l.* 13s. 5d., or an average of about 2,450*l.* per mile. The greatest cost has been 3*l.* 10s. 7d. per lineal yard. A portion of tunnel heading, in Barking-road, cost, complete, about 90s. per lineal yard. The cost of sewer, 9 inches in diameter, laid 10 feet deep, is 6s. 10d. per lineal yard.

There remains to be executed a length of 27,025

* Phenomena of Industrial Life.

† The first contract was taken in June, 1858.

yards * of public sewers, from 3 feet by 2 feet, down to earthenware pipes of 12 inches diameter, at an estimated cost of 26,971*l.*, or an average, including manholes, lampholes, &c., of about 1,800*l.* per mile. The greatest cost per lineal yard will be for sewer in Romford-road, about 40s. The cost of a 12-inch earthenware pipe laid 8 feet deep will be 7s. 3d. per yard. In the sewers executed there are 213 manholes, or a means of access to the sewers for flushing and cleansing, and 100 lampholes for means of inspection; making, on an average of the entire length, one opening to the sewers from the surface of the street or road at about each 87 lineal yards. The manholes have step-irons, flushing grooves, and moveable covers complete, and about 100 have ventilating chambers, charcoal strainers, and ventilating grates. The ventilation and safety of the sewers and house drains will be secured by 200 points of permanent ventilation, where all sewer gases will be disinfected so as to render any accumulation or emission of foul air impossible, and 9,000 side junctions will be provided for house, yard, and other drains. No system of sewers has been executed up to this time with the same amount of facilities for permanent working and ventilation.

Summary.	£.	s.	d.
Works executed as per statement	43,989	5	2
Works not completed as per statement	35,861	0	0
Engineering and superintendence, say	5,615	14	2
Land and compensation, say	3,050	0	0
	8,665	14	2
Total	£88,515	19	4

PUBLIC BUILDINGS IN THE PROVINCES.

Ross.—At a meeting of the committee for the erection of the Ross Corn Exchange, public rooms, and markets, Mr. Nicholson, of Hereford, architect, two tenders were sent in. The first was from Messrs. Hayes & Son, of Gloucester, for the whole of the works, at 2,912*l.*: the other was from Messrs. Pearson & Son, of Ross, at 2,638*l.* Messrs. Pearson & Son's contract being 274*l.* less than the other, it was unanimously resolved that it be accepted. Each of the builders who tendered offered to substitute a Bath stone front for one in cement, should the committee deem it desirable, for an extra sum of 150*l.* It was decided to make an effort to obtain a Bath stone front.

Dartford.—The new cattle-market for this district has just been completed and opened for business. Mr. Bray, the landlord of the Bull, obtained plans from his father, which were submitted to a committee; and, being approved by them, the works were accordingly determined upon. The place selected was contiguous to the Bull yard, and the building was entrusted to the Messrs. J. C. & T. Waller, of Dartford, Mr. Bray, sen., acting as architect. The new building will accommodate about 300 oxen and 1,500 sheep. The market is so arranged that the beasts are placed round, the sheep being in the centre in iron pens, constructed by Mr. Howe, agricultural implement maker. The total cost of the erection was over 600*l.*

Midsomer-Norton.—The new market-place here has been opened, and a monthly market inaugurated. Messrs. Fosters & Wood, of Bristol, prepared the plan of the market-place; and the contract for the erection of the building was let to Mr. Shearn, of Midsomer-Norton, and Mr. Stamp, of Dunkerton. The market-house, which has been erected in the centre of the town, has two fronts, one towards "the Island," and the other towards the road to Stratton. It is Italian in character, and built of the yellow lias stone of the neighbourhood, with freestone dressings, and band courses of Pennant stone. The doors and windows have arched heads; the upper windows being in ranges, and supported by freestone columns, with carved capitals. The market-place occupies the whole of the ground-floor; and a public-room, committee-room, and clerk's office, are on the first floor over it. A separate entrance on the Stratton-street side leads, by a flight of stone steps, to the public-room, which is calculated to accommodate about 300 persons. It has a coved ceiling. The whole is lighted with gas. The gas-fittings were supplied by Messrs. Davis & Son, of Bath.

Cambridge.—The tender of Messrs. Bell & Son for the new Townhall has been accepted, and a beginning, according to the local *Chronicle*, will be made at once. It is hoped that in a year from this time the new rooms will be ready for use.

Loughborough.—The new Police Station, which was to be opened on the 27th ult., comprises a general classification. All the apartments and conveniences, excepting the bed-rooms, are arranged on the ground-floor. Next to Wood-street is the main entrance to the building and court-house, on the right of which is the clerk's office and magistrates' retiring-room, communicating with each other as well as with the court or bench. On the left is arranged the residence for the superintendent of police. The building throughout has been fitted up with gas, the court being lighted with three ornamental star-lights. The magistrates' court and cells are heated from hot-water pipes by Mr. Messenger's triangular tubular boiler. The buildings are executed of red and white brick with Bath and native stone dressings, with rusticated base. The frontage next Woodgate is 47 feet, side front facing the right of road 190 feet. The style adopted is the modern Italian. The architects were Messrs. Bellamy & Hardy, of Lincoln. The same architects have been engaged by the Savings' Bank Committee for their proposed new bank. The works of the Station have been executed by Messrs. Pepper & Dolman, of Spalding; the ironwork by Messrs. S. Frisby & Son, of Loughborough. The clerk of the works was Mr. John Savill.

Manchester.—The corporation of this city have accepted the tender of Mr. James Haywood, jun., Phœnix Foundry, Derby, for the new market about to be erected in the London-road, from the design of Mr. J. L. Lynde, city surveyor. The same firm recently supplied the cast-iron ornamental entrance-gates to the Queen's Park.

Salford.—Rapid progress is being made with extensive additions to Salford Town-hall, but in the rear of the building. There will be a frontage of more than 200 feet to West Market-street, of two stories high. Outside, the building will be plain: inside, some care will be bestowed on decoration. Mr. Evans, the district surveyor, prepared the plans. Mr. Sothern has the contract, the amount being about 6,000*l.* The new building will provide offices for the town-clerk, the surveyor, committee-rooms, large room for the Court of Record, with retiring-rooms, &c., and a new council chamber, 52 feet by 28 feet, and about 22 feet high.

Derby.—The foundation-stone of the new Corn Exchange, in Albert-street, has been laid by the mayor. The new building will stand about fifty yards from the Royal Hotel, in Albert-street at the conjunction of Albert-street with Princess-street, having its greatest frontage in Albert-street, leading to the Morledge. At the junction of the two streets is the principal entrance. The ground plan consists of a circular vestibule, 26 feet in diameter in the clear, having three large entrances from the two streets already named, and all verging to one centre. From the central vestibule are entered the various offices; the telegraph-office, ante or cloak rooms, the large concert-room, and the principal staircase to the rooms above. On the Albert-street frontage, owing to an irregularity in the site, various offices are obtained, together with cloak-rooms and entrances to the large hall. A private entrance for reserved seats is also obtained, having cloak-rooms on each side of it, and possessing separate entrances from thence into the large hall. These front offices are only proposed to be one story in height, with a lead flat roof and stone parapet, so that windows are obtained in the hall above them. There will be two news-rooms, one circular, 26 feet in diameter, lighted by three stone windows, and communicating through sliding doors with another room, 20 feet by 17 feet. The dimensions of the large hall are 110 feet by 55 feet. The committee decided upon adopting designs recommended by Mr. Wilson, for the interior, at an increased cost of upwards of 300*l.* This will now form a concert-room, as well as a room for the Corn Exchange, and other purposes, there being in this case a double instead of a single roof, a ceiling divided into compartments, which are agnin sub-divided into domes, the flat surface at the top being filled with glass, and the sides covered and divided into ornamental panels, starting from a moulded plaster soffit, which is supported by ornamented plaster corbels sprung from the sides of the hall. The gallery runs up the two sides parallel with the walls, but the end opposite the orchestra is semi-circular, and it is capable of seating about 400 persons. The exterior will be erected with bricks and stone dressings, in the Italian style of architecture. Mr. Benjamin Wilson furnished the plans and design. ——The tenders for sewerage works in Derby having been opened by the Sewerage Committee of the local Board of Health, Mr. William Hyslop's, amounting to 1,468*l.* 8s. 4d., being the lowest, was accepted.

SCOTLAND.

Galashiels.—There has been a grand Masonic demonstration here at the laying of the foundation stones of the Galashiels Public Hall and Corn Exchange. The public hall will be, externally, 75 feet long by 45 feet in width, and it will have a spire. The plans were designed by Mr. Lessells, architect, Edinburgh, and the builders are Messrs. Herbertson & Son, their estimate being 2,368*l.*, which includes the plaster and plumber work. The hall proper is on the second story, the lower part being set apart for sheriff and police-court rooms, committee-room, kitchen, and other necessary accommodation. The dimensions of the public hall are 70 feet by 40 feet. The building is of freestone in front. The windows of the hall are arched with cornices above, and the roof is to be finished with a block cornice. The orchestra gallery will be placed in a recess in the centre of the south wall. The large hall will accommodate 500 people seated at dinner. The Corn Exchange, erected by Messrs. R. & A. Stirling, of this town, is a plain erection. The length is 59 feet, and the width 30 feet; height 22 feet to the tie joists. The roof below this is open, and of dressed wood, which will be stained and varnished. It is lighted entirely from the roof, and, like the other erection, has a freestone front, the back part and side walls being of the common blue stone of the greywacke formation of the district. This building also contains a committee-room and other accommodation for the use of the farmers and grain dealers, and it can be let for public meetings, concerts, &c.

Leith.—Some time ago competitive plans were obtained for a new Corn Exchange for Leith, and the competition resulted in the adoption of designs by Messrs. Peddie & Kinnear. Contracts have now been entered into for the work, and the erection of the building will be proceeded with immediately. The site is the angle between Baltic-street and Constitution-street. The building is in the Roman style, and includes a corn-hall or exchange, 110 feet in length, and 70 feet in breadth. This apartment has a roof of one span, supported on semicircular ribs of laminated timber. Light will be admitted entirely from the roof, and the hall will be so finished as to afford accommodation for public meetings, &c. This hall occupies the rear of the building. That portion of the structure fronting Baltic-street includes offices in connection with the exchange, and five or six suites of chambers for merchants. Externally, the building comprises a large octagonal tower, placed at the conjunction of the two streets. This tower rises one story above the other elevations of the exchange, and is finished by a dome surmounted by a small octagonal lantern: the rest of the building is of two stories, each arcaded. The whole will be executed in polished ashlar, Kenmure stone being used. The contracts, which amount to 4,000*l.*, are several hundreds below the architect's estimate. The contractors are Mr. George Lorimer for the mason-work, and Messrs. Henderson & Wilson for the wright-work.

CHURCH-BUILDING NEWS.

Ipswich.—The south aisle of St. Matthew's Church was, at the commencement of the present year, extended as far as the east end of the chancel, and the latter restored and benched, the new part being also filled with open seats. The old part of the church is of a Late Perpendicular date, and the additions are carried out in the same style. The roof of the new part of the south aisle is of a low pitch, with moulded tie-beams, supported by corbels carried by angels. Pierced tracery fills in the space above the tie-beams, and carved bosses are placed at the intersection of the intermediate timbers. The mouldings are ornamented throughout with four-leaved pateras and other carving. More funds were collected than required for these works, and it has now been decided to bench the nave and north aisle with square-headed benches, and to build a new south porch. The total cost of the works will amount to between 1,100*l.* and 1,200*l.*, and the increased accommodation will exceed 200 sittings. The contractor for the general work is Mr. Garnham; for the pulpit and reading-desk (of carved oak and stone bases), Mr. Ringham; for the stone work, Mr. Newson; for the plumbing and glazing, Mr. Manning; and for the benching of the nave and north aisle, Mr. Bacon,—all of Ipswich.

* The completed sewers, and those to be completed, will measure together about 30 miles. The commissioners' scheme would have measured only 12,157 yards, or rather less than seven miles, and was estimated to cost 80,000*l.*

Messrs. Hart & Son supplied the brass gas standards and altar railing. The architect is Mr. R. M. Phipson, of Ipswich.

Brighton.—The chief stone of the Church of St. Michael, situate in the Montpelier-road, opposite the Temple, has been laid by the Vicar of Brighton. The founders of this church are two ladies, who have contributed 4,500*l.* Mr. Fabian was the contractor. The edifice is of brick, and will have 550 sittings, 350 free. The site cost 1,250*l.*

Upper Sapey (*Herefordshire*). — The parish church of Upper Sapey has been closed for some months, in order that it might undergo a renovation and improvement; and it has now been reopened. Previously to its restoration the church consisted of chancel, nave, south porch, and western bell turret. The church being in a very damp, dilapidated, and unseemly state, and the turret and roof showing unmistakable signs of giving way, Mr. W. J. Hopkins, of this city, says the *Hereford Times*, was called to report upon the best method of effecting a thorough restoration of the edifice. The plans prepared by him were subsequently adopted, and the work has been carried out, under his superintendence, by Mr. Warner, of Leigh. As much of the old church as possible has been preserved, including the greater portion of the walls, the doorways, and original windows. The chancel arch, being inconveniently small, has been removed to the west end, where it forms an opening into the tower. The latter is entirely new: the belfry stage, of wood, is surmounted by a shingled spire. A three-light Middle-pointed window has been inserted at the east end, and a two-light window of the same style on each side of the nave. Stained glass for the east window is being prepared by Mr. Preedy. The single light in the north wall was transferred thither from the west end. The roofs are open, that in the chancel being of oak, and the nave roof of deal. There is a lofty pointed chancel arch, formed of alternate courses of light and dark tinted stone. The open seats in the nave are of deal, of a simple design. All the woodwork is simply varnished. The floor of the nave is laid with Maw's red and black tiles. Minton's tiles, the gift of the Rev. E. Addenbrooke, are used in the chancel: they have a blue and white border. In front of the altar is a row of *memorial* tiles, bearing inscriptions to the members of the Addenbrooke family, many of whom are buried in the church, and to whose memory were some stone slabs, for which the tiles are a substitute. The stained window is given by Mrs. Newman. The exterior of the walls has been relieved of the plaster and whitewash, and pointed and drained. The roofs are covered with Broseley tiles. The total cost of the renovations will approach 1,000*l.* Sir Thomas Winnington, Bart., gave the sum of 500*l.* towards the restoration fund: the recently-appointed rector, the Rev. Phipps Onslow, gave 150*l.*; Mrs. Newman, 100*l.*

Corris.—Corris and Machynlleth are two scattered hamlets, which generally go by the simple designation of Corris, and are situated in a wild and romantic spot at the south-east extremity of the county of Merioneth. Here a new church has been erected. The style is Early English. The windows, which are nine in number, are of the concrete form, and the one in the chancel is of stained glass. The roof is of stained pitch pine, and the floor is of flags, obtained at the adjacent quarry at Genwern. The edifice was erected at the cost of Lord and Lady Vane, to the memory of their relative, the late Sir John Edwards, Bart.

Wrexham (*Denbighshire*).—The chancel of the new church of St. Mark, Wrexham, has lately been decorated in polychrome. The prevailing tone is murrey. The central panel over the altar, on a light green ground, presents the sacramental emblems, the corn and vine, in a cruciform arrangement, encircling a white cross, interlaced with the sacred monogram, on a crimson ground, diapered in gold. On the right of the central panel are the Creed and Lord's Prayer; on the left the two tables of the Law in old church text, emblazoned in gold and colours, and surrounded by borders. Above these in gold medallions are the emblems of the four evangelists in panels, which contain also representations of the lily, surrounded by a border of light grey. The designs were furnished by Mr. Fisher, of the firm of Harland & Fisher, Southampton-street, London, and executed under his direction.

Lutterworth.—The church of Ashby Magna, near Lutterworth, has been restored and reopened. In the present year a public subscription, amounting to something like 400*l.*, having been raised, it was determined to restore the church as far as the funds would allow. Mr. Firn, of Leicester, was appointed to carry out the alterations, and under his management, and that of Mr. Clifton, who has supplied the woodwork, the restoration has been partially completed. The windows on the south side have been altered, and a new one inserted in the place of the southern porch. The gallery has also been taken down, and open deal varnished seats have been substituted for the pews. The church will now accommodate nearly 300 persons. Something has also been done to the walls, columns, and arches, the whitewash having been scraped off, and the original stonework exposed to view. A carved pulpit of Bath stone has been erected, and a font of similar design, together with a new vestry adjoining the chancel.

Horsley.—The work of church restoration, now so busily carried on in Derbyshire, has been brought to its completion as far as Horsley is concerned. The old church, dedicated to St. Clement, has undergone a thorough renovation, and been formally re-opened for Divine worship. The total cost of renovation has been about 2,000*l.* The work has been carried out by Messrs. Kerry and Allen, of Smalley, the contractors for the stone and wood work. The vicar has been engaged in carrying out the architectural details. The principal portion of the cost of the work has been defrayed by Miss Eliza Sitwell and other members of the Sitwell family.

Rochdale.—The new church recently erected at Norden, near Rochdale, has been opened for Divine service. The church is a plain structure, with a spire, a nave, and a north aisle separated from the nave by arches. The seats are open stalls, and will accommodate 600 people. The cost has been between 2,000*l.* and 3,000*l.* Mr. Shaw, of Saddleworth, was the architect. A small stained glass window, at the north end of the church, was presented by him, in which are inserted the names of the chief promoters of the undertaking. Another small stained glass window, in memory of the Rev. Mr. Hodgson, has been presented by Mr. T. Fferrand Dearden, who has also presented the church with a baptismal font.

Colne.—The cemetery at this town has been completed, and was lately consecrated by the Bishop of Manchester. The cemetery contains about six acres of sloping ground, and the Board have erected two chapels, each 30 feet by 16 feet inside, with tower and spire between them, 80 feet high; also a lodge at the entrance gates. The whole has been designed and carried out by Mr. Pritchett, of Darlington, whose design was selected in competition about a year ago.

ST. PATRICK'S CATHEDRAL, DUBLIN.

A WRITER in *Saunders's News-Letter*, commenting at some length on the letter in our pages signed "Mediævalist" (p. 597), denies its correctness, and calls it "an ebullition of ill-temper and envious feelings." In the interest of architecture and our national antiquities, we have one question to ask for ourselves,—are the works under the direction of a properly qualified and experienced architect?—a question we have before now put. We have the greatest respect for the fairness and good intentions of the *News-Letter*, and have no doubt it will assist in obtaining for us a distinct reply. The works ought not to be allowed to go on at St. Patrick's, without satisfactory guarantee that they will be executed with skill, conscientiousness, and loving care.

In our notice last week of works progressing in Ireland, the fifth paragraph should commence, "St. Audeon's Church, Dublin, has been recently partly restored." The printers turned it into "St. Andrew's." St. Andrew's is at present a ruin, having been destroyed by fire, as already noticed.

TORQUAY INFIRMARY.

A WING has lately been added to the Infirmary in this town, for the reception of fever patients. Plans were advertised for, and those sent in by Mr. Edward Appleton, architect, of Torquay, were approved, and have been carried out. The new buildings consist of rooms in the basement, for offices, &c., not yet to be fitted up: on the ground-floor level are two convalescent wards, closet and lavatory, entrance-porch, and a room for the surgeon.

The upper floor is occupied by the fever wards, two in number, with nurses' rooms, lavatories, and water-closets; the two latter in a separate building, with the lavatories placed between the wards and the water-closets, and thorough ventilation provided for in each.

Upwards of 1,500 cubic feet of space is allowed for each patient: the wards are 24 feet wide and 16 feet high, with windows carried up to within a foot of the ceiling on three sides, and the fourth side is provided with ventilating screens of perforated zinc, controlled by flaps: in addition to this an exhausting-shaft passes over each line of beds, above the ceiling, with ventilators at intervals; and these communicate with a flue carried up in the chimney stack.

The heating is by open fireplaces. The probable cost, including fittings and furniture, will be about 90*l.* per patient. The walling is of limestone, hammer-dressed, with tooled main quoins, &c.

Mr. John Harvey, of Melville-place, Torquay, is the builder.

TRAMWAYS ON ROADS WITH CARRIAGES PROPELLED BY MANUAL LABOUR.

SIR,—Both publicly and privately I have long suggested the adoption of tramways for *roads* as well as for *streets*, from one end of the island to the other. My plan was only adopting that which has been so long and successfully tried in Friday-street, Cheapside, the Commercial-road, up Reigate-hill, &c., viz., by laying down a double line of the long granite kerb-stone of the streets in a double line for the wheels of all carriages to run on. This plan is cheap, safe, practicable, and humane,—dispensing with half the horses. The produce of the land they consume would afford employment and bread for all unskilled labourers, disbanded militia, discharged and discarded prisoners without end. Well, Sir, an ingenious American has at last persuaded us, at Birkenhead, and at Burton-on-Trent, to adopt the tramway of New York and Boston, on two lines of iron; but surely these are both expensive and perishable, compared with granite. No matter: only give us a rail; and I have great pleasure in presenting to the public three or four carriages, easily worked by manual labour, promising them both health and pleasure. I have amused myself with the subject, and, from experiments made on common roads, am pretty certain that on rails they will lay the foundation of improvements that may, ere long, supersede, in a degree, both steam and horses. I anticipate the return of much traffic and pleasure, now lost, on our public roads.

D. F. W.

A BRIEF HISTORY OF THE GREAT BELLS.

SIR,—Upwards of four years have passed away since the first great bell, called "Big Ben," for the clock at Westminster Palace, was cast; and many readers will remember that, while he was temporarily suspended from a beam at the foot of the tower, in October, 1857, he received a death blow. During the month of May, 1858, his successor, Big Ben the Second, was produced; and, having been raised to his chamber in the clock-tower in October, and subsequently fixed to the large iron beam, he proclaimed the hour at the bidding of the clock on or about the 12th of July, 1859. But on a certain day in the month of September, in the same year, he was silenced also. So much for the performances of the two Big Bens.

A few days after the latter occurrence, a suggestion from a correspondent appeared in the leading journal to the following effect:—"Let the clock strike the hours, *pro tem.*, upon the largest of the four bells, intended for the quarter chimes; the other bells being mute." Time, however, still rolled on silently; and thus it has continued up to this moment; so that about twelve months have elapsed since the clock struck—a space of time more than sufficient for designing, casting, and hanging one of the finest peals of twelve bells in the world.

With respect to the condition of the great bell, the "Reports" by Dr. Tyndall, Dr. Percy, and the Astronomer Royal, may be interesting so far as they relate to the cavities, cracks, and composition of the bell. But, whatever may be the opinion of these eminent professors as to whether it may again be made use of without any risk of breaking, the all-important question is;—"What is the condition of the bell in a *musical* point of view?" I must say, then, that it is by no means satisfactory; for, though we may perceive no jarring, nor grating of surfaces of the cracks; and though the note of the bell may have been called pure, it is defective, very doleful, and, in my opinion, incurable. The truth is, that, since this Big Ben the Second was fixed in the clock-tower, he has never given out his "*fundamental note*" with its proper complement of "*harmonics;*" and this is the reason why the sound emitted does not "ring" like that of a perfect bell. In other words, this suggests the reason why the sound which strikes the ear is destitute of grandeur and richness of tone. Nevertheless, for the

satisfaction of all parties, he might remain in his chamber until the next meeting of Parliament, or until any questions relating to him or to his successor shall have been well considered.

But, as far as we know, there can be no reasonable excuse for the non-employment—long before this—of the largest chime-bell above mentioned, as a temporary substitute for Big Ben. Moreover, some months ago, the Chief Commissioner of her Majesty's Works stated, in the House of Commons, that means would be used for causing the clock to strike the hours upon the largest quarter [chime] bell. Why, then, does it continue silent?

THOMAS WALESBY.

A HINT FOR THE LORD MAYOR ELECT.

SIR,—As a reader of your paper I would venture to suggest (through its columns), that, if not otherwise arranged, the City authorities would act consistently by placing in the vacant corner, near Cannon-street, a statue of *Sir Christopher Wren*.

Perhaps, sir, the new Lord Mayor (Cubitt), this day elected (September 29th), may have the good taste and power to do so. In such case, there could be no more fit and appropriate motto, than

CIRCUMSPICE.

*** The suggestion has been made before in our pages, more than once; but as it is just possible that the Lord Mayor elect may be glad of a fitting and cognate opportunity to connect his name for long to come with the adornment of the City and the progress of art, we allow our correspondent to repeat it.

SPONTANEOUS FIRES.

SIR,—Seeing the paragraph on this subject in your impression of the 15th ult., I would suggest that some of our numerous associations should institute an inquiry with the view of discovering and making known all the conditions favourable to spontaneous combustion. A vast amount of property is annually destroyed by fires originating in the spontaneous combustion of hay, rags, waste, cotton, flax, grain, coal, and other materials, as well as the spontaneous ignition of lucifer matches. As the conditions essential to such combustion are discoverable, the whole of these fires with proper care might be prevented. An association for the prevention of spontaneous fires would accomplish much good in a manufacturing country like this. Many of the fires in factories and stack-yards are no doubt wrongly attributed to incendiarism, and some, perhaps, as wrongly ascribed to spontaneous combustion. The insurance companies should see to it.

W. PATERSON.

ST. ANDREW'S, HOLBORN.

SIR,—Among the ecclesiastical ornaments of the metropolis, the church of St. Andrew's, Holborn (one among the finest works of Sir Christopher Wren), bears a high place, whether estimated by its beautiful interior or externally by its finely-proportioned tower; while its advantageous position on the brow of a hill, and open to a wide and public thoroughfare, gives it additional interest as a work of art. It is, therefore, with more than ordinary regret (I may add, and with great disgust) I have noticed a brick chimney shaft and high chimney pot lately stuck conspicuously in its north-east angle, making it look more like a manufactory than a church. Had such an appendage been really requisite, it is monstrous that, with the ample funds that church possesses from a landed estate in the parish, such a vulgar unsightly disfigurement should be perpetrated to so fine a building. But I believe the whole to be as needless now, as it has been hitherto since the church was erected. This, however, is not all; for when we remember how many of our public buildings have fallen a sacrifice to fire arising from ill-constructed or defective chimneys, and observe this trumpery affair passing close to the timbers of the roof, it gives rise to painful doubts as to the safety of the edifice.

Do, pray, Mr. Editor, raise your powerful voice against this desecration.

AN OBSERVER.

THE DIPLOMA QUESTION.

SIR,—Your correspondent of Sept. 22nd has undoubtedly expressed the opinions of many besides himself on the Diploma question, and has taken a just, proper, and reasonable view of the matter; but still it would be necessary for the Institute to lay down certain regulations and conditions in granting diplomas to *present practitioners*; for, if the diploma is to give that stamp of respectability and status to the profession which it must do, or it will be in a great measure useless, even many present so-called architects, in the persons of builders, auctioneers, house-agents, and the like, must be excluded, and the architect of the future must be a purely professional man, in no way mixed up with trading or other pursuits connected with, or liable to bias him in, his architectural practice. The Institute should define what an architect is not to be as well as what he is to be; and an infringement of its laws should entail the forfeiture of the diploma. The Institute should also settle the fees of every kind to be charged by architects, together with the usages and practice of the profession.

It could not be expected, neither would it be right, that an old practitioner, grown gray in the profession, should have to subject himself to a qualification examination, perhaps by his juniors, when the best proofs of his competency and ability are his works. Neither would it be just to subject younger men to such an examination when the same proofs of their genius and talents exist. But whatever a man's ability and genius may be, it must be a *sine qua non* that in his future career he shall be a purely professional practitioner, subject to the laws laid down by the body granting the diploma; and the aim of such laws should be to raise the tone and status of the profession in respectability as well as in competency. Until this is the case, architecture will never take its right position with the sister arts in public opinion, and will always be subject to the degradation and insults so rife at the present time. Then, and not till then, will the profession be a united body; and not till then will the present disgraceful system of competition cease. But when architects are artists and gentlemen in the true meaning of the words, then will our art revive, grow, and flourish, and receive that respect and appreciation which are its due.

AN ARCHITECT.

THE HAYMARKET THEATRE.

THE antique fable of "The Sun and the Wind," never out of date, supplies a story for a pretty ballet at the Haymarket. It is very well acted and danced by the Leclercs, before a pleasant and characteristic scene, and has the merit of telling the story intelligibly and gracefully. Mr. Falconer's comedy, "Does he Love Me?" plays admirably, and, moreover, will be acted all over the country; for it needs but one scene and six performers, who have all parts that will act themselves. A real actor usually seems to have the best part in a piece, and very often, of course, really has it; but it is a question whether, in any other hands and mouth than Mr. Buckstone's, *Bubble* would have taken the prominent position it has in the play in question. Bubble is a lawyer's clerk, with a sufficiently good opinion of himself to believe that he incarnates the whole firm, and is sent down to make a communication which, fortunately for the audience, he is never allowed to do. There is no man now on the stage who has the same unvarying command over the risible faculties of an audience as Mr. Buckstone. Can we usefully quote a sentence from the play? Yes. "A good upholsterer," says one, in the first scene, "must be imbued with a spirit of poetry." We commend it to the serious attention of the whole trade.

PATENTS IN CONNECTION WITH BUILDING.*

WATER-CLOSETS. — *T. Culpin*, Dowgate-hill, London. Dated 31st January, 1860.—These improvements consist, firstly, in the application of a flexible diaphragm to retain the water in closets and other sanitary vessels, at any required level. Secondly, in an arrangement of pan-closets so as to admit of those parts usually made of iron and copper to be constructed entirely of earthenware. Thirdly, in a mechanical arrangement for making the flushing apparatus of such water-closets and other sanitary vessels self-acting. Fourthly, in an arrangement of valves in connection with such water-closets and other sanitary vessels. Reference to the drawings is essential to a full description of the invention.

FURNITURE FOR DOORS, BELL LEVERS, LAMP AND CHANDELIER ENRICHMENTS, &c.—*J. Smith*, Birmingham. Dated 4th February, 1860.—This invention consists in the production of furniture for doors and drawers, bowls for castors, bell levers, curtain band, cornice pole, and lamp and chandelier enrichments, and the ornamental parts of other similar articles. The material is of, or partly of, a composition or plastic composition not hitherto used for these purposes. The materials employed for black composition articles are shellac, ebony dust, and charcoal. If coloured composition articles be required, the charcoal must be omitted or reduced in quantity, and any suitable colouring matter, such as powdered pigments, must be added.

APPARATUS FOR PRODUCING AN ARTIFICIAL DRAUGHT IN CHIMNEYS, AND FOR PURPOSES OF VENTILATION.—*W. E. Newton*, Chancery-lane, London. A communication. Dated 14th February, 1860.—This invention consists of an upright throat, which, when applied to a chimney, is fitted to rotate upon the open end of the chimney-pot, or upon an upright shaft or pipe. This upright throat terminates in an elbow, at the back of which there is placed an open horizontal truncated cone, the truncated or smaller end of which is next the elbow, and is concentric with and surrounds the elbow pipe, and a shorter truncated cone is connected by its truncated end to the truncated end of the larger cone. These two larger cones contain the elbow and the smaller cone within them, and their truncated ends unite opposite the mouth of the elbow. The top of the large cone may, if desired, be furnished with a vane to keep its mouth and the mouth of the small cone towards the wind, or in the direction in which a pressure of air in a horizontal direction may be produced by the movement of the body to which the apparatus is attached, and the air which is caused to rush through the small cone and the elbow, and through the annular space between them and the larger external cones, produces a powerful upward draught through the elbow pipe. An artificial draught may also be produced by introducing a jet or jets of steam at the mouths of the cones.

WINDOW SASHES.—*T. Allen*, Little Smith-street, Westminster. Dated 15th February, 1860.—This invention consists in so fitting and hanging window-sashes that, while they present all the appearance and have all the facilities of ordinary sliding sashes, they have further the capability of lowering or falling horizontally within the house or building for the purposes of cleaning them. For this purpose the patentee fits sliding pieces in the channels or slides of the window-frame of a thickness rather more than that of the beads: these pieces have the sash lines and weights attached to them, all in the manner of ordinary windows. Between these sliding cheeks or pieces he fits the glazed sashes, rebating them thereto to form as tight a joint as possible, at the lower part of which sash he disposes centre pins or gudgeons on which the sashes move as on hinges, and on which they are free to fall towards the interior of the building when they are released and required so to do. Thus the sashes are free to rise and fall in the ordinary manner, with their counter balance weights, each moving as a whole with the side sliding pieces between which they are fitted. Spring or other catches are applied at the top of the sashes, and attached to sliding cheeks, which catches secure the sashes in position and connection therewith: these same catches are also used to catch in the window-frame in order to prevent the side cheeks running up when a portion of the weight of sash is removed therefrom.

WINDOW FRAMES AND SASHES.—*W. H. Elkin*, Belvedere-road, Lambeth. Dated 16th February, 1860.—According to this invention the portion technically called the pulley style is made loose, being kept in its place, and pressed equally against the sash or shutter, by means of springs at either end of it. One or both of the pulley styles may be thus fitted, but it is found in practice that the purpose is sufficiently answered by making only one of the pulley styles movable. Sashes and shutters made on this principle may be used with or without weights and pulleys, according to the size and character of the window. If fitted with weights and pulleys, the sash line is hooked over a screw head or button fixed to the sash or shutter, instead of being nailed to the sash as is at the present time universally done. The removal of the sash or shutter is effected by pressing it sideways against the spring pulley style, which yields sufficiently to allow the sash to be disengaged from the beads of the opposite pulley style. The free side is then drawn inwards, and the other side of the sash liberated from the beads of the spring style. In cases where a sash line is used, the same is then unfastened, and the sash or shutter is disengaged. The pulley style may also be easily taken out of the frame to repair the weights or lines.

* Selected from the *Engineer's* lists.

Books Received.

Healthy Moral Homes for Agricultural Labourers, showing a good Investment for Landlords, with great Advantage to Tenants. By C. VINCENT BERNARD. London: James Ridgway, Piccadilly. 1860.

WITH very good intention and some knowledge of the *Builder* amongst other books, Mr. Bernard has here brought together, for a small price, a variety of useful information on cottage building, and twenty-four pages of plans and details, good, bad, and middling. A "bill of quantities" accompanies each design, but the estimated cost of the various cottages is much lower than our own experience would lead us to place it at.

Sixth Report of the Association for Promoting Improvement in the Dwellings of Agricultural Labourers in Scotland. Office, 53, North Frederick-street, Edinburgh. 1860.

THIS contains a supplementary report, with specifications and designs, for cottages, &c., by Mr. James C. Walker, architect and secretary to the Association, and is an exceedingly desirable shilling's-worth for those who interest themselves, or who ought to interest themselves, in the subject. We have before now spoken of the valuable matter contained in the reports of this Association.

Miscellanea.

Hospital Construction.—The second note in Dr. Combe's plan for a hospital (p. 606, *ante*), should stand thus:—"The latest, and, as far as I know, the best and completest detail of these principles is to be found in the various papers by Mr. Roberton, of Manchester; *in those* which have appeared in the *Builder*, especially three in August and September of 1858; and in the papers by Miss Nightingale which were read to the Social Science Association at Liverpool." The omission by the printer of the words "in those" attributed to Dr. Roberton, erroneously, the authorship of our leaders of August and September, 1858. Next week we shall give some observations on Dr. Combe's plan. It should be quite superfluous to say that we do not necessarily agree in all the views the statement of which by correspondents we insert. Out of differences and discussion come certainty and truth.

Iron Bridge at Bordeaux.—This bridge rests upon ten piers about 230 feet apart, and is formed of enormous iron tubes. The columns which compose the piers are 75 feet high, and terminate in a handsome capital of entirely new design, rising some 60 feet above the ordinary level of the river. Many difficulties which were thought to be well-nigh insuperable have been overcome by the use of hydraulic rams, and some very ingenious apparatus invented by Mr. Nesven, the engineer in charge of the works. The bridge was commenced in 1858, and it is hoped that the present year will suffice for its completion. An engraving of it from a photograph appeared in the *Illustrated Times*.

Epsom Salts.—The spring of mineral water at Epsom is said to have been first noticed in Queen Elizabeth's days. It seems, however, to have had an older origin, and to have been found by one Henry Wicker in the year 1618. Its property as a purgative was first ascertained, according to Aubrey, about 1639. Its virtue depends on the presence of sulphate of magnesia, which was obtained from this water by chemical processes, and sold under the name of Epsom salts. The water is colourless and pellucid: it has no odour, and but a slight saline taste. The quantity of saline matter held in solution in this water is variable. Dr. Lister obtained from a gallon of the Epsom water taken up during a dry season one ounce and a half of solid substance; while Dr. Lucas, on evaporating a similar quantity of the water, procured but five drachms and one scruple of residuum.

Branch of Ladies' Sanitary Association for Manchester.—A meeting has been held in the Manchester Townhall, at which Mrs. William Fison, of Brighton, read a paper, and urged the formation of a branch of the Ladies' Association, established in London four years ago, mainly for the improvement of the homes of the poorer classes. The Rev. James Bardsley, M.A., introduced Mrs. Fison to the audience. The Association, she said, was formed by a few ladies who desired to alleviate the physical condition of the poor, and to popularize information on sanitary subjects. It was most important to provide counter attractions to the beer-shop and gin palace; and, wherever practicable, newsrooms should be established, where the working man could see the papers and have a cup of cheap coffee, like a gentleman at his club, without being driven to more objectionable places for them. Mrs. Fison pointed with sorrow to the sad violation of the Creator's immutable laws amongst the poor, and put to shame those landlords who sacrificed precious life and health by ill-ventilated dwellings, possessing neither pure water nor good drainage, so essential to life. She quoted the emphatic words of Professor Owen:—"It is proved to be practical to make those garments, the frail bodies of the population, last fully ten years, or probably one-third longer, in the wilderness of this world." Dr. Southwood Smith asserted with confidence that the cause of the depression which induced the poor to drink was bad air. Crime was not the necessary attendant of poverty or low wages; but it was most abundant in crowded towns and ill-drained localities. The encouraging fact was mentioned that the Religious Tract Society was about to publish a sanitary series of tracts. The cheap pamphlets of the Ladies' Sanitary Association, she remarked, deserved the widest publicity. The titles of a few, from a halfpenny to twopence in price, are, "The Worth of Fresh Air," "The Use of Pure Water," "The Value of Good Food," "The Cheap Doctor," with others devoted to the feeding and clothing of infants. In Brighton and other places the happiest results had followed from these sanitary labours.

Bazaars and Lotteries.—It has hitherto been not unusual for the articles left unsold at bazaars, held for building or charitable purposes, to be disposed of afterwards by lottery. It appears, however, that that method of dealing with them is quite illegal, and, if practised in future, may be attended by unpleasant results. The Solicitor of the Treasury has just pointed out to some promoters of a bazaar at Stourbridge, that their proposal to hold a lottery would render them liable to heavy penalties, and it has been found necessary to abandon the scheme.

Public Opening of the Victoria Terminus and Thames Bridge.—The new terminus at Pimlico and the railway bridge across the Thames, near Battersea Park, with the lines of rail in connection with the Crystal Palace and Brighton railways, were all opened to the public on the 1st instant. Progress, we may here note, is also being made with another railway bridge a little above Battersea and Cremorne, by means of which and the connecting lines of rail the railways on the south side will be brought into junction with those on the north through the short West of London line. Great changes in the railway conveyance centering in the metropolis are thus on the eve of occurrence. Further progress is also being made with the foundation cylinders of the Charing-cross railway bridge on the Surrey side.

House Building in China.—The erection of a house is well worth watching, though to be next door to one is dreadful, as the workmen keep time to a barbarous, monotonous, drawling tune the whole time. A scaffold of 14 feet having been erected, a dozen boys mount upon it, and by means of a heavy stone drive down a row of piles in order to make a firm foundation. Now it is this pile-driving that is so objectionable. The leader of the gang keeps time by singing a song which no pen of mine can describe. Attached to the stone are ropes, so that they (each holding one) can drop it on the head of the pile. After five blows they join in chorus—such a chorus! At ten strokes they stop, waiting for their leader to sing a verse solo; then the chorus and ten thumps; then a solo and a rest. And so they keep on from five a.m. to five p.m.—*The Englishman in China*.

The Glass Trade.—Messrs. Sowerby & Neville, of Gateshead, says the *Gateshead Observer*, are recorded among the patentees of the month. Their patent is for "moulds for making pressed glass." This invention consists in holding the body of the mould down on to the bottom thereof by means of pins or trunnions, which enter suitable holes made for their reception in the bottom; and in forming a flange on the top of the plug to determine the thickness of the glass at the top or rim: the inventors are thus enabled to dispense with the top ring, upright hinge, and catch.——The workmen of Messrs. Sowerby & Neville's flint-glass works have come to no arrangement with their employers yet, and are therefore still out on strike.——The representatives of the Belgian glass-trade have been proposing to the French government, since the treaty with England, that French glass should be admitted into Belgium *duty free*, on condition that Belgian glass, on its importation into France, should pay a duty of not more than 9 per cent.

The New Camber Dry Dock for Portsmouth.—The foundation stone of this new dock has been laid. By the Act obtained for its formation, the council were empowered to borrow 30,000*l.* upon the security of the borough rate; and the contract for the construction of the dock was taken by Messrs. Bottomley and Hanson, at between 28,000*l.* and 29,000*l.* Since the undertaking was commenced the contractors have dissolved partnership, and the work is now being carried on solely by Mr. William Hanson, under the superintendence of Mr. C. W. E. Pineo, the engineer to the Corporation. The dock is to be 345 feet long, by 70 feet wide, and there is to be a concrete foundation of 4 feet 6 inches thick. The greatest depth will be 23 feet 6 inches; and it is calculated that the dock will hold a vessel of upwards of 2,000 tons. The materials, &c., required for the work are as follows:—Granite from Cornwall, 10,700 cubic feet; Roach Portland stone, 101,000 cubic feet; Purbeck stone, 12,000 cubic feet; Memel timber, 500 loads; excavation to be removed, 25,000 cubic yards; clay for dam, 1,700 cubic yards. Only about one-third of the bottom of the dock has yet been completed. Up to the present time about 2,000 tons of worked stone is on the ground, varying in weight from six tons downwards. The unfavourable weather which has prevailed during the late summer season greatly retarded the progress of the works, and the excavations, in consequence, were made with great difficulty.

Projected Railway in Jersey.—A number of gentlemen interested in the establishment of a railway between the towns of St. Aubin and St. Helier met last week in the town of St. Helier, to consider this subject, when a committee was formed, and the States of the Island, it is said, are to be pressed to facilitate the undertaking.

Hereford Old Town-hall.—Mr. Clayton states that the block with the use of which we were favoured was made from his restoration,—a restoration founded on the present remains and an old vignette engraving on the corner of Price's Map of the City. Mr. Clayton adds a long letter denying the correctness of Mr. Anthony's statements. We do not find in it, however, sufficient matter of general interest to justify the devotion of the space it would require.

A new Church at Paddington.—The foundation-stone of the church of St. Michael and All Angels, in the district parish of St. John, Paddington, has been laid. Mr. Hawkins, of Stanhope-street, is the architect of the edifice, which is designed to be a chapel of ease, capable of containing about 1,000 free seats.

The late Mr. J. C. Wells, Architect, United States.—We have to mention the death of this gentleman, a prominent architect of New York, on board an English steamer, bound for this country, of which Mr. Wells was a native. He died two hours before the vessel reached land. He designed several of the public buildings of New York, including Dr. Phillips's church on the Fifth Avenue. Various large stores, and a court-house at Wilkesbarre, Pennsylvania, also illustrate his skill. He held the office of treasurer in the American Institute of Architects.

The late Mr. Thomas Motley, C.E.—This gentleman died at Washington, U.S., on the 13th of July last, aged seventy-six. He was formerly of Bristol, and was the projector of the design of the wrought-iron arch bridge over the Avon from the rocks at Clifton, a model of which was exhibited many years ago. He went to America about seven years since, in hope of getting his plans adopted in that country. Last year, in consequence of the severity of the previous winter, he became affected with a disease of the hand, underwent the amputation of three of his fingers, and seems never to have thoroughly recovered from the shock. He was interred in the Friends' burial-ground at Washington, and his remains were attended to the grave by the mayor of Washington, several official persons connected with the Government works, and a number of friends and acquaintances, by whom he was highly respected and much regretted.

The late Mr. Joseph Locke.—The *Daily News* gives expression to the opinions of many when it says,—"So long as Joseph Locke lived and laughed and laboured amongst us, there were obvious reasons why we should abstain from challenging the neglect which he experienced in high quarters, and his exclusion from office, court, and coterie. When we think of the rubbish with which lofty places are filled, of the imbeciles and impostors we are annually called on to pay for doing mischief or doing nothing, and who are daily jobbed into every species of public preferment, we cannot feel surprised that the presence of a hard-headed, clear-sighted, independent-minded man like the late Mr. Locke should have been deprecated diligently, and carefully avoided. If posts of power and responsibility were once thrown open to middle-class men who have proved themselves fit for them, the craft of the Ephesians would be in danger, and the great imposition would fear to be set at nought. But the sordid prudence which exigently seeks to preserve power and emolument in close monopoly hardly requires that the impudent and dishonest rule should be applied as strictly in other matters. Social courtesies and personal marks of distinction convey, indeed, to none but the most ignorant the idea of recognition of public service. A profligate or a fool, if he be only sprung from the right loins, is certain of either or both. Usefulness, perseverance, consistency, energy, inventiveness, talent, or the universal respect of the community, are, we well understand, but dust in the balance where the broad riband of the Bath or the rank of Privy Councillor is in question; and as for baronetcies, they are professedly given as prizes for the greatest number of hedges and ditches of which the competitors can show themselves to be the owners, great works and great virtues having nothing whatever to do with the matter. For engineering services rendered to France, Mr. Locke was decorated in that country with the cross of the Legion of Honour: in England, where he had earned ten times the gratitude and reward, the rule of the Government is to spurn and ignore such men."

The Masons' Strike in Leeds.—We are glad to learn that there is some probability of this strike being shortly brought to a termination, as the masters and the operatives have agreed to submit the matters in dispute to arbitration.

Employment of Women at the Great Northern Railway.—The abandonment of the coal trade by the Great Northern Railway Company is the occasion of some stir at King's-cross. The directors have given up the business to others, for whom they have recently built offices in the station. The circulars now issuing are said to have required the united labour of twenty-six clerks (all of whom are young women) a full fortnight to fold and address them, while the postage-stamps alone have absorbed 125*l*.

Essex Archæological Society.—The annual general meeting of this society was held on 27th ult., in the Old Castle, Colchester. It was the first occasion for opening the new museum of antiquities in the Roman Chapel, which has been granted by Mr. Charles Gray Round, and a large number of the gentry and clergy of Essex attended: a great many ladies also were present. The Rev. Charles Merivale, B.D., read a paper entitled "Notes of the Roman Conquest of Essex." Mr. Merivale controverted the statement of Professor Airey, that Julius Cæsar landed in Essex, and endeavoured to show that history and popular belief were right in fixing upon Kent as the place where the Roman conqueror landed. The Rev. J. H. Marsden next read a paper on "Greek Coins found in Colchester." Mr. Duncan, in a paper on "The Roman Topography of Colchester," pointed out the several localities where the tesselated pavements and other Roman antiquities had been discovered. The visitors inspected the antiquities of the town, and dined together at the Cups Hotel.

Statues and Monuments.—The Government is said to have refused to give metal for the statue to the late Sir John Franklin, proposed to be erected at Spilsby.——Tenders have been accepted for the enclosure of the Nelson Monument at Yarmouth. Mr. E. O. Johnson, of Yarmouth, undertakes the stone-work at 188*l*., and Mr. Barnes, of Norwich, has contracted for the iron-work, at 117*l*.——The statue of the late Mr. Robert Hall, M.P., is now finished, says the *Leeds Intelligencer*, in the studio of Messrs. Dennis, Lee, & Welsh, Woodhouse-lane. It is a representation of the deceased gentleman in his robes, as the recorder of Doncaster.——A monument to the late Mr. H. A. Littledale has just been erected in the church of Bolton-by-Bowland. The style is Perpendicular Gothic. The façade comprises an arcade of three double sunk ogee arches, standing on moulded base and plinth, the spandrils being filled in with open tracery. These arches are flanked by two butments, having canopied buttresses, and filled in with tracery and armorial bearings, the whole being crowned by a moulded cornice (with carved vine-leaves), surmounted by a broken battlement of open tracery. Within the arcade is placed the gravestone, with an incised crosslet, surrounded by a nimbus, and standing on a calvary of four steps, and the incision is filled in with blue cement. At the back of the tomb is the inscription.

Electro-Telegraphic Progress.—The Pneumatic Despatch Company have commenced laying down their pipes in Throgmorton-street.——About 1,000 miles of telegraphic cable, manufactured by Messrs. Glass, Elliott, & Co., are, it is said, to be used between Rangoon and Singapore. The distance is 800 miles, but allowance has to be made for "slack," and for any casualties that may arise. It has not been finally decided, however, that the cable shall be laid between these points, although the idea of submerging it between Falmouth and Gibraltar appears to have been altogether abandoned by the Government, from the uncertainty of success to which so many failures with deep sea cables have naturally given rise. We are not aware that any vital improvement has been made by Messrs. Glass, Elliott, & Co. in this new (?) scheme.——Two lines of land telegraph from the Atlantic to California are now in rapid progress. The most northerly, which passes through Kansas and Nebraska, is expected to be so far completed in November that the remaining gap will be only about 1,000 miles.——The aurora borealis is said to produce a remarkable effect upon telegraph lines. The auroral current has even been used, it appears, for transmitting and receiving telegraphic despatches, on the American Telegraph Company's line between Boston and Portland, and upon other American lines. The line named has been worked in this manner more than two hours; and, when the aurora subsided, the batteries were of course resumed.

Memorial Drinking-Fountain at Southampton.—The ceremony of laying the first stone of the monument to the memory of the late Mr. Alderman Richard Andrews, in the public park of this town, took place on the 1st inst., in the presence of thousands of spectators. The design is a drinking-fountain, surmounted by a pedestal and a statue, 9 feet high, of Mr. Andrews. The whole building will be above 25 feet in height, will stand on a high spot of ground, and will be visible at a long distance. The architectural building forming the fountain is described as being in two stories, and of a triangular form, the style being Provençal Romanesque. Each of the three faces will be sheltered by a deeply recessed arch, below which will issue the fountain with double *jets-d'eau* crossing each other under the crown of the arch. The fountain will be adorned with inscriptions and carvings commemorating and illustrative of the life and character of Mr. Andrews.

Kitchen Boiler Explosions.—Accidents of this kind are not unfrequent, and something should be done, in perfecting kitchen arrangements, to obviate such risks. A safety-valve, opening in the side of the boiler, next the fire, so as to prevent weights from being set upon it, and to obviate scalding with the steam, might do. An explosion of a kitchen-range boiler has just taken place, we observe, in a house at West Derby, Liverpool. The accident, which was of a very dangerous character, was occasioned by one of the servants inadvertently turning the tap of the feed pipe, by which the water-supply was stopped. In a short time the boiler became overheated, and the expansion of the steam caused it to explode with fearful violence. A large portion of the kitchen wall was blown completely out: the kitchen-range and fireplace were shattered to pieces; and the furniture was thrown into a promiscuous heap.

Brisbane, New South Wales: Opening of a Chapel.—In June last, a new Independent chapel was opened for divine service at Brisbane, in Eastern Australia. The chapel is situated near Government House, on the rise of the hill. The walls, according to the Brisbane *Guardian*, are of brickwork stuccoed outside and in, and the mouldings and water-tables are run in Portland cement. The entrance is in the second bay on the south-east side of the building, and is protected by an open-timbered porch. On the opposite side is a vestry of similar design to the porch. The roof is finished at the south-west end with an open turret. The gables are filled in with windows of open tracery: that at the south-west end is circular, and at the north-east triangular, the tracery being executed in cedar and painted. The lateral windows and those in the south-west gable are lancet shaped, and finished with hoodmoulds with foliated terminations. The roof is open timbered, and constructed of Queensland pine: it is supported on six pairs of principals with curved ribs, each forming a pointed arch. The interior is not quite finished, as it still requires a coat of warm colouring on the walls. The pulpit is of varnished cedar. The seats are of pine, stained. The style is the transition from the Early English to the Decorated. Mr. Tiffin, the colonial architect, provided the design, and contributed his services in the erection of the edifice.

A new Roman Catholic Church, dedicated to St. Anthony, has been opened at Walker, near Newcastle-upon-Tyne. The nave is 100 feet long by 30 feet wide; and the church, when completed, will altogether comprise about 850 sittings. The nave, south transept, and baptistery, containing accommodation for 600 people, forms the portion already completed, at a cost of a little more than 1,700*l*. The remaining additions are a north transept and a bell tower. Stone is the material used in its construction, and the woodwork in the interior is stained and varnished. The cost of the whole, when finished, will be 2,100*l*. Instead of the usual east window, the chancel is lighted from above by a flat light of stained glass, fixed in the highest point of the roof, throwing a red, subdued light on the altar and chancel. On the exterior, the place of the east window is occupied by a carved niche, to contain a life-size statue of St. Anthony, the patron saint of the church. The roofs, which are very high, are of open timber-work of simple construction, and, like all the other woodwork, are stained and varnished. A gallery for the choir, which, however, does not project into the church, is constructed in the transept. With the exception of a rose window in the transept, there is no attempt at ornamentation. A presbytery now in course of construction adjoining the church is also included in the designs of Mr. Archibald M. Dunn, the architect. The contractors are Mr. W. Foggin for the masons' work, and Messrs. Waite & Howard for the carpenters' work.

Aluminium Works.—Extensive works for the manufacture of aluminium and aluminium bronze have recently been erected at Washington, says the *Newcastle Courant*, and are likely to be kept in active and profitable employment. Mr. Bell has secured the sole right to use the patent for making this new metal, from Professor Deville; and, under the superintendence of Mr. Henry Brivet, the works (the only ones in this country as yet) have been erected.

Gas.—The owner of the gas-works at Whitby, Mr. Anthony Atkinson, M.A., is erecting new works, at a considerable outlay, on a site between the river Esk and the railway. It is expected that they will be completed before the end of this autumn. The railway company has contracted with the proprietor for the supply of gas for fourteen years. The price of the public lights has been reduced, and a uniform charge of 5*s.* per 1,000 cubic feet is made to private consumers, instead of 6*s.* 8*d.*, as heretofore.——The Plymouth and Stonehouse Gas Company, from the 29th September, have reduced their price to 3*s.* 4*d.* per 1,000 cubic feet.

TENDERS

For consecrated and unconsecrated chapels to the cemetery now being formed at Halifax, Yorkshire. Mr. Chas. H. Edwards, architect. Quantities supplied by Messrs. Pearson & Doughney:—

Whiteley, Brothers	£3,100	0	0
Pratt	2,840	0	0
Drake & Co.	2,700	0	0
Evans, Brothers	2,485	0	0
Charnock & Booth	2,407	0	0
Robertson	2,400	0	0
Bancroft & Son	2,261	0	0
Pickard & Co. (accepted)	2,237	0	0
For Plumbing.			
Lees	185	0	0
Walsh	178	14	0

For rebuilding the Red Lion, Brompton, for Mr. Lathbury. Mr. G. A. Burn, architect:—

Piper	£2,593	0	0
Myers	2,369	0	0
Turner & Sons	2,320	0	0
Downs	2,170	0	0
Laurence & Sons	2,134	0	0
M'Lennan & Bird	2,045	0	0
Stimpson	2,945	0	0

For Barmby Dun Church. Messrs. Hadfield & Goldie, architects:—

Messrs. Aneley	£1,258	0	0
Hopkins & Read, Scoles, Dodworth, and White	1,173	4	6
Simpson	1,122	0	0
Chadwick & Son	1,099	0	0
Richardson (accepted)	1,095	12	0

For a passenger station at Marske, Yorkshire, for the Stockton and Darlington Railway Company. Mr. Wm. Peachey, architect:—

Bulmer	£1,560	0	0
Robson	1,257	9	7
Armitage	1,115	3	10
Pearson	1,060	10	0
Chapman	1,044	10	0
Kemp & Abdale	1,029	13	6
Elwin (accepted)	1,015	1	4

For a pair of cottages, at Colney Hatch. Messrs. Richard Tress & Chambers, architects:—

Deards	£960	0	0
Fowler	942	0	0
Hawkes	920	0	0
Eley	898	17	6
Pearse	875	17	0

For two new dwelling-houses, Percival-place, Tottenham, Middlesex, for Mr. Orme. Mr. James Dudley, surveyor. Quantities supplied:—

Chessum	£850	0	0
Humphreys	835	0	0
Brett	820	0	0
Turner & Sons	797	0	0
Cushing	757	0	0
Baldwin	750	0	0
Clarke (accepted)	748	0	0

Received by the vestry of Chelsea for the supply of

Broken Granite.

	s.	d.	
Messrs. Fennings	13	6	per ton.
Mowlem & Co.	13	5	,,
Messrs. Mannelle (accepted)	12	11	,,

Flints.

Smeed	4	9	per yard.
Tyler	4	6	,,
Tuff	4	6	,,
Hart	4	5	,,
Baldock (accepted)	4	5	,,

Sewerage Works.

G. Todd, jun. 2½ per cent. discount from price in schedule.
King & Howe* 10 per cent. ditto.

Mason's Works and Materials.

Robinson } Referred to a committee.
Nowell & Robson }

* Accepted.